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Out of Sight, Out of Mind: How Proximity Influenced Access During Computer Supported Collaborative Authoring.

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Out of Sight, Out of Mind: How Proximity Influenced Access During Computer Supported Collaborative Authoring.

by

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DEDICATION

For my husband, Matt.

There are 42,071 words in this dissertation. You matched each one with an act of selfless love and support. Without you this work would not be complete-

and neither would I.

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ABSTRACT

Out of Sight, Out of Mind: How Proximity Influenced Access During Computer Supported Collaborative Authoring.

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In spite of the popularity of technologies that facilitate distance learning, institutions still educate students who gather together in shared physical spaces. But now even these traditional settings for learning are more collaborative and technology-rich environments. Qualitative methods in the sociolinguistic tradition allowed me to attend carefully to the vocal and non-vocal interactions of students engaged in a computer supported collaborative authoring assignment. Three research questions guided my inquiry: 1) In what ways did students negotiate roles and responsibilities?; 2) In what ways did students negotiate access to their assignment?; and 3) what was the nature of discourse in computer supported collaborative authoring? I conducted microanalysis of the communication in online discussions and face-to-face discourse throughout an entire semester of one graduate level course entitled The Psychology of Teachers and Teaching. My data revealed that the online discussion forum, physical proximity to the computer during face-to-face collaboration and instructor influence shaped the students' roles and responsibilities as well as their entry into the assignment. I propose a model illustrating

how students negotiate entry into computer supported collaborative authoring assignments and discuss its implications for teaching and learning.

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CHAPTER ONE

Figure 1.1

Technology-rich learning environments and current theories of human learning necessitate that institutions, instructors and individual students make numerous decisions about how to design and support collaborative work- both pedagogically and structurally. Consider how the different group formations shown in Figure 1.1 afforded each student a qualitatively different kind of learning experience. How was their communication shaped or mediated by their proximity to the technologies that anchored their interaction? Did various physical relationships to one another and their technological learning tools promote differences in their roles and responsibilities as group members? How did subtle socio-contextual distinctions affect their ability to access and contribute to their collaborative assignments? The students in these images also met together in online discussion forums as they prepared to interact in computer supported collaborative

authoring groups. How were their face-to-face interactions related to their work in online forums? Questions such as these will continue to emerge as interpersonal and technological resources converge in twenty-first century classrooms. One recent review of literature suggested that "as the boundaries of the research expand, the confluence of the trends suggest a movement towards the understanding of Technology in Support of Collaborative Learning" (Resta & Laferriere, 2007, p. 66). It is important to discern how computers influence collaboration when people learn together both online and in a technology-rich physical classroom space.

In this study, qualitative methods allowed me to attend carefully to the nuanced ways that students used computers to communicate with one another during a computer supported collaborative authoring (CSCA) assignment in a graduate-level course. During the course, small groups of students collaborated both online and face-to-face to identify, discuss, synthesize and present research findings to their fellow classmates. I focused particular attention on the vocal and non-vocal communication around notebook computers central to their face-to-face class sessions. However, I also investigated the relationship between students' communication in online discussion forums and their face-to-face discourse. Socio-cultural and constructivist theories of human development, learning and interaction influenced my methods of data collection and shaped my perspective during data analysis. Three broad questions guided my inquiry into these issues, including:

1) In what ways did participants negotiate group roles and responsibilities?

2) In what ways did participants allocate control of, and share access to laptops used during CSCA?

3) What was the nature of discourse in computer supported collaborative authoring (CSCA)?

In Chapter One I briefly introduce the developments in educational environments and research that informed the foundations of this study. In Chapter Two I situate this study with respect to additional scholarly literature concerned with infusing technology into the process of teaching and learning. I also consider research on group dynamics and technology in collaborative learning. In my review of related literature, I describe how discourse analysis and other sociolinguistic approaches have shaped my thinking and methodology in this study. In Chapter Three I describe the research setting and participants. I relate the methods I employed in developing grounded theories about the nature of discourse in CSCA through careful qualitative consideration of the data. In Chapter Four I report findings from broad-scope analysis of the total corpus of the data. I detail my findings from more fine-grained analysis of three selected cases of CSCA in Chapter Five. And in Chapter Six I discuss the major themes that emerged from data analysis. I share my understanding of how the findings around my first two research questions build an answer to the third question regarding the nature of discourse in CSCA.

Background

As computers first entered into schools and universities researchers quickly discerned the need to question how they shaped those educational environments. Many early studies investigated how new technologies influenced human interaction within the walls of the classroom (Crook, 1994; Daiute, 1986; Dickinson, 1986; Hermann, 1989; Wegerif, 1997). Shortly thereafter, networking technologies allowed educational activities to escape the confines of those traditional classrooms. Therefore, a significant body of research in instructional technology (IT) has focused on communication in fully electronic settings. Studies on the nature of communication through tools such as e-mail,

courseware, chat rooms, and virtual classrooms abound (Simpson, 2005; Wegerif et al., 2010; Yang, Yeh, & Wong, 2010). Some of the many examples of studies on learning and collaboration through computers include investigations of mentoring relationships via e-mail (French, 2000), small group work via groupware (Nicol & MacLeod, 2005), and project based learning carried out through a secure web space (Wilkinson, Miles, Bateson, Selke & Holley, 2002).

People developing and experiencing distance education quickly discovered how unique characteristics and idiosyncrasies distinguished it from more traditional approaches and settings. Subsequently, much attention was devoted to comparing human interactions that occurred in more traditional learning environments with interactions in fully electronic settings. Researchers have conducted comparisons of student achievement, satisfaction, engagement, and learning outcomes in face-to-face and online environments (Hawkes, 2007; Johnson, Aragon, Shairk, & Palma-Rivas, 2000; Karatas & Simsek, 2009; Rabe-Hemp, Wollen, & Humiston, 2009; Strauss, 1997; Summers, Waigandt, & Whittaker, 2005). I call these types of studies "versus studies" because they often treat the two modes of interaction as dichotomous.

Whether drawing comparisons between online and traditional settings or concentrating solely on computer-mediated communication, IT research has recently and rightly explored the dynamics that emerge when computers function as a medium for interaction and learning outside the four walls of a physical classroom. However, educators, learners and institutions have not abandoned face-to-face settings in which to foster knowledge. In spite of our newfound capabilities for teachers and students to conduct classes at a great physical distance from one another most schools, colleges and universities still build and utilize classroom environments where human beings gather in person in a shared physical space. Students still transport themselves and their personal

learning tools (backpacks, writing implements, notebooks and laptops) to rooms occupied by a variety of shared physical objects such as tables, desks, chairs, chalkboards, projectors, screens, computers and more. Both the personal and public objects in classroom environments mediate and facilitate the learning experiences that occur therein.

But even our traditional learning spaces are no longer what they used to be. Face-to-face environments continue to be transformed with instructional technologies. Settings that are completely devoid of any electronic learning tools are becoming increasingly rare. Public and private institutions at the primary, secondary and post-secondary levels have invested millions in dollars and human resources in the quest to update face-to-face facilities. Coley, Cradler and Engel (2000) reported "it is estimated that over 4.4 million computers are currently installed in America's classrooms and the ratio of students to computers has dropped from 125 students per computer in 1984 to the current ratio of 10 students per computer" (as cited in Lou, Abrami & d'Appollonia, 2001, p. 449). Parents, policy makers and professionals feel the need for modern classrooms to prepare students for the ever-increasing pervasiveness of technology in daily living, working and learning. Recent studies indicate even lower student-to-computer ratios exist today. According to Caruso, Smith and Callaway (2009) the percentage of college undergraduates who own a laptop computer has increased from 65.4% in 2006 to 88.3% in 2009.

Increasing the number of computers available to teachers and learners has altered how they are positioned in the classroom context both literally and figuratively. Changing the number of computers available to students and teachers has also changed how they are used. Evolution in the social and contextual use of computers has important implications for instructors and students (Lou, Abrami, & d'Appollonia, 2001). With the

infusion of new technologies, our physical classroom environments have experienced a gradual yet perceptible shift. In technology-rich, face-to-face environments computers function not only as a medium through which interpersonal communication can occur. Rather, they are now incorporated more and more seamlessly as one of many tools found in the shared learning space of a classroom. In other words, interaction in technology rich face-to-face classrooms can become:

> an exchange that is not governed by computers, but catalyzed...by them...now the technology becomes a focus for a parallel interaction: joint activity that teacher and pupil organize between themselves. An encounter with the computer is thus assimilated into the broader social fabric of educational activity (Crook, 1994, p. 99).

I argue that failing to thoroughly investigate these changes may result in educational practices based on unexplored assumptions. Each day instructional technology becomes more pervasive, more accepted as the educational status quo. As time passes technologies are more readily assimilated into our daily ways of being in classrooms. When technologies become invisible to us due to widespread acceptance, we may think less critically and research less insightfully how they are shaping our face-to-face learning experiences.

A body of research that considers face-to-face communication and computer-mediated communication as two opposite ends on the interaction spectrum may overlook a very significant middle ground. Versus studies can reveal important distinctions between communication and learning that occurs via different media and modes for human interaction. Research focused on fully electronic settings can help us build strong online learning communities and maximize the benefits of distance learning. But neither of these approaches can fully address the already prevalent and ever increasing use of

instructional technologies within face-to-face environments. In terms of technology-rich classrooms, perhaps it is time to think inside the box again. There is much to gain from research in learning spaces that happen to exist within four physical walls. We should refresh our efforts to describe classrooms where computers are "used as a supplement to, rather than a substitute for, other modes of interaction" (Strauss, 1997, p. 259).

The availability and placement of computers in physical learning environments are not the only changes to occur in recent years. As philosophies of education have come to emphasize the importance of shared understandings in human learning, group work has become more and more prevalent in teaching. Often the use of new technologies and new instructional methods coincide. One recent review of literature confirmed a concurrent emphasis on collaboration noting use of the term *interactivity* in research on both educational pedagogy and technology (Beauchamp & Kennewell, 2010). Many instructors in post-secondary settings design face-to-face or blended courses that integrate both technology and group work into the curriculum (Laferriere, Lamon & Breuleux, in press). Some argue that the increased use of technology "has outpaced understanding of how students can learn effectively in such environments" (Hartley, 2001, p.285). As a result we still know too little about the communication that occurs within groups of students working with each other in person while they are using a computer.

The class described and analyzed in this study was an excellent example of the nexus of modern instructional theories and technologies. The course operated as a learning community guided by socio-constructivist theories of learning. CSCA group members were continually empowered to make many decisions about their own curriculum and learning. Instructional technologies were integral in facilitating their collaboration and education over the semester. Participants self-selected weekly group

membership based on a shared topic of interest. Therefore, group sizes varied week to week. First, group members communicated asynchronously for one week in an online discussion forum. Individuals identified, posted and responded to pertinent research articles there. During the following week they had face-to-face discussions while seated around notebook computers in a shared physical classroom space. Within face-to-face meetings, small groups worked to summarize the research articles they had previously posted. Participants then synthesized their discussion and findings into one document that they presented to the whole class.

Students composed their assignments using presentation software on personal notebook computers provided by class members. The number of notebook computers available for use in the collaborative authoring task varied as well. Each week students volunteered to take on the role of topic leader. All participants were required to serve as topic leader at least once during the semester. This requirement notwithstanding, CSCA group members were not assigned particular roles or responsibilities to guide their interaction. They had minimal formal instruction regarding how to use or share the laptops with one another while working on the collaborative authoring task.

It is important to note early on that the task in which these students were engaged, however, was somewhat different from a task often termed collaborative writing. Collaborative writing is a complex process with subtle distinctions in its definitions (Passig & Schwartz, 2007; Sapp & Simon, 2005; Sharples et al., 1993). In much recent research however, the term collaborative writing connotes for many a writing task in which multiple contributors create and edit an electronic document in a shared electronic space (Kessler, 2009; Ornubia & Engel, 2009; Schlotter, 2009). Collaborative writers can choose from a variety of approaches for distributing and identifying individual contributions to the collaborative document (Ornubia & Engel, 2009). Although the

group members in this study did work together to create the synthesis document, they did not share electronic access to the document they were creating. Rather, one notebook computer provided by a group member was used to create the document. Only one group member actually typed text into the document at any one time, translating the group members' ideas into text. I called this group task "computer supported collaborative authoring" or CSCA rather than collaborative writing in order to distinguish two different approaches to collaborative creation of a text. Additional descriptions of the CSCA group membership and the nature of the tasks they were engaged in will be explored in greater detail in chapter three.

In sum, noteworthy changes have transpired in the number of computers available to students and teachers, the position of computers within the learning environment and the instructional roles played by technology in recent years. Theories of human learning have also shaped how people interact with one another and the tools available in their classrooms. These socio-contextual changes should prompt us to revisit the areas of inquiry that early researchers identified. Considering such salient changes in the ways in which computers are integrated into educational environments today, early ethnographic and sociolinguistic research (Bruce & Michaels, 1989; Crook, 1994; Dickinson, 1986; Wegerif, 1997) remains remarkably insightful and relevant. However, the environments in which these investigations were conducted are not representative of the use of electronic learning tools in twenty first century classrooms. Maintaining a strand of qualitative research in IT can help us see changes in the socio-contextual nature of technology over time as access increases, and as capabilities and affordances change. I believe this study helped to identify further areas in which to explore the complexities emerging where teaching and learning commingle with small group interaction, collaborative authoring, and instructional technologies.

CHAPTER TWO

Review of Literature

This investigation involved a complex intersection of several areas of research interests. Subsequently, there were very few current studies that incorporated all relevant areas into one investigation using qualitative microanalysis. In lieu of tapping into a large, established body of directly related research, the project described herein was informed by investigating several related areas of research. Therefore, it is important that the study be positioned within preexisting knowledge about teaching, learning (small group learning in particular), and instructional technologies (specifically computers). Furthermore, sociolinguistic methods and discourse analysis have seldom been employed in studies of face-to-face environments within the field of IT. Therefore, it seems important to review some literature on research methods and trends in discourse analysis in order to discuss the valuable ways we can apply the findings they produce in educational settings.

Hopefully, this study will prompt consideration of myriad theories and areas of inquiry in relation to one another, revealing potential connections between them. Perhaps we can open dialogue between related disciplines about how research efforts in IT and discourse analysis might further inform and benefit one another. To this end, what follows is a review of literature that explores three broad themes: 1) infusing technology into the process of teaching and learning; 2) group dynamics and technology in collaborative learning; and 3) discourse analysis: research methodology and practical applications in educational settings. Clearly, these areas are merely constructs with

which to organize the following discussion. It must be noted that some overlap between the categories is to be expected.

INFUSING TECHNOLOGY INTO THE PROCESS OF TEACHING AND LEARNING

We have already noted the incredibly rapid growth in the prevalence of instructional technology in a wide variety of educational settings over the last two decades. Since educational technology has been introduced, some researchers have been skeptical about whether or not equipping classrooms with new technological tools substantially changes instruction or benefits students (Clark, 1983; Cuban, 1986, 1998). Some have suggested that new technologies may be merely assimilated into existing classroom cultures and practices (Bruce & Michaels, 1987; Ertmer, 1999; Hannafin & Savenye, 1993). Others believe that integrating technology can catalyze reform (Jonassen, 1995; Pappert, 1993; Plomp & Pelgram, 1993; Sandholtz, Ringstaff, & Dwyer, 1997). The issue of whether or not technology changes teaching and learning for the better is one of the original and persistent research questions about technology in education. Perhaps this is one reason that Webb and Cox reported mixed findings from a review of research "on pedagogies associated with the use of information and communications technology in . . . schools" (Webb & Cox, 2004, p.235). Mixed results appear to be representative of the corpus of research into of whether or not technology affects teaching and learning (Becker & Ravitz, 1999; Ferguson, 2004).

As early as 1987 researchers like Bruce and Michaels were asserting that incorporating computers into elementary writing instruction, "did not radically reorganize the teaching and learning of writing in the classrooms. Rather, the technology was shaped to fit into already established patterns of social organization and assumptions about doing and valuing writing in school" (Bruce & Michaels, 1987, p. 2). Over the years other researchers echoed their claim. In a well-known critique, Clark likened

instructional technologies to the grocery truck. He claimed that a computer was no more likely to change instruction than was the nutritional value of a banana going to be altered by the vehicle delivering it to the local supermarket (Clark, 1983).

Similar assertions have been made about the results of incorporating technology at the post-secondary level. Pamela Ferguson, for example, examined the relationship between instructors' pedagogical beliefs and teaching styles and their beliefs about teaching with technology. Her case study of a small liberal arts college found that college faculty tended to integrate instructional technologies in ways that aligned with their existing beliefs about teaching and learning (Ferguson, 2005). In contrast, over the same period of time others claimed that infusing new technology into instruction served as a catalyst. Many argue that instructional technologies have sparked changes in the ways teachers and students carry out the business of learning (Jonassen, 1995; Pappert, 1993; Plomp & Pelgram, 1993; Sandholtz et al, 1997). The studies cited in the following pages, conducted in both K-12 and post-secondary settings, support this assertion.

Professionals in elementary and secondary schools around the world believe that new tools drive educational change and have implications for student outcomes. In Sweden, Svensson (2000) investigated the interactions of elementary school students to compare their interactions in front of computers with their interactions during other kinds of school activities. She found that children displayed twice as many interactions in front of the computer than they did in other types of activities. She also found that children were more likely to engage in interactions that were on-task and concerned with problem solving when they were in front of the computer. Her results show that the kind of technology involved in student interactions can shape how students communicate with one another.

Many researchers have found evidence that computers can alter teaching and learning in post-secondary settings as well. In fact "According to Bartolic-Zlomomislic and Bates (2000), those in higher education institutions believe that improving the quality of learning is a key reason to adopt e-learning technologies" (Laferriere, Lamon, & Breuleux, 2005, para. 1). In post-secondary engineering design classes, Nicol and MacLeod (2005) claimed that incorporating courseware and shared laptops improved information sharing and collaboration within semester-long group projects.

Several researchers share my focus in the specific areas of technology integration in writing and authoring (Passig & Schwartz, 2007; Sharples, 1993; Sapp & Simon, 2005). For example, Colette Daiute studied Junior high school students engaged in revising tasks using either pencil and paper or word processors. Her early study led her to suggest that "the writing instrument can affect the writing process" (Daiute, 1986, p. 141). During that same year, David Dickinson conducted an ethnographic study in which he analyzed the talk of children using either pencil and paper or computers while engaged in writing tasks. Dickinson's observations, field notes, and transcript analyses revealed that instead of "directing most of their talk about their work to teachers…. When they worked at the computer, children had to articulate their plans and their reactions to what their partner was writing" (Dickinson, 1986, p. 376). He concluded that "the computer was a tool that fostered collaboration" (Dickinson, 1986, p. 368).

Jones and Pellegrini also claim that the media students use to complete their assignments can have an effect on their learning and their interaction. These authors analyzed the students' verbalizations while writing together as well as their completed papers. The authors questioned whether or not any differences emerged over time between computer-supported versus pencil-and-paper writing technologies. They determined that "students' narratives composed with a word processor were lexically

denser and more cohesive than their narratives composed with pencil and paper. [Furthermore], Students' talk during computer-supported writing episodes included more metacognitive terms than their talk during pencil-and-paper writing" (Jones & Pellegrini, 1996, p. 691).

In a literature review of studies in K-12 education, Andrea Hermann suggested incorporating computers into writing instruction could result in a more collaborative classroom environment (Hermann, 1989). Hermann's early review of literature claimed that:

> Preliminary evidence suggests that the nature of peer collaboration and feedback in classrooms where computers are used to teach writing differs from that in regular writing classrooms. Under certain conditions, computers as writing tools appear to promote a collaborative environment, both in learning to write and in learning to use the technology (Hermann, 1989, p. 4).

Hermann's caveat that computers can catalyze instructional change under certain conditions opened an intellectual space the current proposal aimed to fill. Micro-ethnographic scrutiny of the conditions shaping groups using laptops as authoring tools further informs us of the complex conditions needed to encourage successful collaborative authoring.

Taken together, much research does offer evidence that equipping classrooms and teachers with computers and related technologies can catalyze pedagogical changes. Based on existing research, we can at least claim that infusing educational environments with technology has the potential to change teaching and learning. Most interestingly, researchers who conducted the aforementioned studies on writing and authoring all discussed how integrating computers influenced or even prompted collaboration in classrooms. At least in these cases, technology integration appeared to have an effect not

only on the deliverable assignments, but also on the communication that occurred during their creation. In other words, using computers as authoring tools changes not only the authors' product, but also the authoring process. As a result, the current project will not ask *if* the laptops used in the CSCA groups observed in this study shape collaborative authoring, but rather *how* they do.

GROUP DYNAMICS AND TECHNOLOGY IN COLLABORATIVE LEARNING

It is not entirely surprising that researchers investigating computer use in classrooms included discussions of enhanced collaboration in their findings. Advances in the technologies we use in classrooms are not the only changes that have crept into educational practice over recent decades. Constructivist and socio-constructivist theories of human learning have also gained prevalence in our field (Fosnot, 1992; Greeno, Collins & Resnick, 1996; Svinicki, 1999). Socio-constructivist learning theories purport that the creation of knowledge is a shared rather than individual enterprise (Fosnot, 1992; Greeno, Collins & Resnick, 1996; Svinicki, 1999). The resultant educational pedagogies emphasize the interplay amongst learners and within the social contexts in which learning occurs. Subsequently, the use of group work has multiplied and is now incorporated in more and more educational settings of all kinds. Whether causal or coincidental, practitioners and theorists have seen the philosophies that guide pedagogies shift concurrently alongside the rise of instructional technologies. Technology and group work often go hand in hand in modern learning experiences (Beauchamp & Kennewell, 2010; Bonk, 1998; Dede, 1995; Wolfe & Alexander, 2005).

What are the potential implications of contemporary tools and strategies for the teachers who have to design and evaluate instruction? One outcome is that instructors at all levels are trying to create collaborative learning experiences that make use of the new technological tools available in the world of education and the world at large. However,

teachers are too often left to base decisions about how to effectively design and evaluate learning experiences on intuition alone. Problems can arise in the learning environment when "A substantial portion of...courses are taught by relatively inexperienced instructors who are encouraged to assign teamwork but [are] given little advice or support in structuring these teams" (Wolfe & Alexander, 2005, p.163).

It can be difficult for instructors to design group learning experiences because of the incredibly wide variety of factors influencing the effectiveness of collaborative work. Practitioners and instructional experts in curriculum design have much to consider in creating collaborative experiences that benefit students. Lou, Abrami, and d'Appollonia (2001) conducted a meta-analysis based on over 480 independent findings from 122 studies involving more than 11,000 learners. Their research confirms that several variables influence how effectively groups function in classrooms. For instance, gains reported in Lou et al. (2001) for students engaged in group work were more pronounced when the tasks were challenging, when groups size included three to five members, and when the software used by groups provided little or no feedback.

These findings confirm empirically what many students report anecdotally- not all groups can function effectively. Thus, it is important to generate research that will help instructors create effective collaborative experiences. Otherwise teachers may incorporate collaboration for the sake of the approach without realizing that "Not all groups function in ways that are optimal for learning and cognitive development" (Webb & Palincsar, 1996, p. 855). The following discussion explores many, but certainly not all of the factors influence whether or not small group activities will be a benefit or a bane to students. In fact, the instructional designers themselves are one of the many factors that can mediate the effectiveness of collaborative learning.

Teachers' implicit theories and experiences with collaboration surely shape their design and use of collaborative learning in their curriculum. Some research has shown that teachers tend to incorporate technology in ways that align with their implicit theories about instruction (Ferguson, 2005). Teachers also integrate technology in ways that are tied to their own experiences in learning to use technology. Therefore, if teachers are not adequately prepared to infuse group work with technology then it can become more a blight than a benefit to learning.

However, professional development can enhance an instructor's ability to design effective experiences involving collaboration. One study by Taylor et al. examined teachers' professional development in order to determine its effects on their students' use of and learning with technology. They found that more gains emerged between pre- and post-tests for students of teachers trained to use constructivist approaches with technology than those who were not. Furthermore, these teachers were more likely to be using constructivist methods in their classrooms after training (Taylor, Casto & Walls, 2005). The Taylor et al. findings suggest that sometimes habits of learning can 'trickle down' through teachers' practice to students. Methods used in teacher education and development thus take on deeper meaning. Using effective strategies while teaching practitioners how to incorporate technology and peer learning in successful ways is paramount. Subsequently, we need detailed descriptions of what effective interaction looks like when computers enter the group learning process. We can thereby more effectively prepare teachers to design and assess group work that incorporates technology to the benefit of their students. This proposed study represents a small step in the direction of that very goal.

Students can also make designing effective collaborative learning a daunting task. Individual group members all have ideas and backgrounds that influence what they

bring to, and take away from group work. Many a learner has experienced frustration with one group member that hitched a ride to a final grade on the shoulders of more diligent students. Conversely, others have struggled to get their ideas acknowledged in a group dominated by one over-ambitious member. Even dynamics operating more subtly than these extreme examples of group dysfunction can have profound effects on the success of collaborative learning. Students' gender, social status, ability level, and propensity for group vs. individual work all mediate functionality when people work together to complete a learning task (Palincsar, 1998; Webb and Palincsar 1996).

For example, Wolfe and Alexander analyzed case studies, student interviews and questionnaires revealing that in some collaborative writing teams, certain members (often male) leveraged computer expertise within the group to avoid making substantial contributions to more challenging group work. In these cases the computer expert made low level technical contributions like formatting, rather than engaging in more cognitively demanding tasks such as actually researching, writing, and revising the collaborative assignments (Wolfe and Alexander, 2005). Their study offers but one example of how more information can still be useful in the pursuit of improving how group work and technology intermingle in our classrooms (Beauchamp & Kennewell, 2010; Bonk, 1998; Dede, 1995; Wolfe & Alexander, 2005).

The effects of group dynamics are also tied to the nature of the cognitive shift the learner is expected to make. For example if an instructor wishes for students to acquire a completely new skill or correct a misunderstanding, it is more effective to have them collaborate with an adult or much more experienced peer. However, if the goal is for the learner to expand upon or enhance current knowledge it may be more effective to place that learner within a more homogeneous peer group for collaboration (Palincsar, 1998).

Furthermore, the role of assessment can play a part in determining the effectiveness of group work experiences. Positive interdependence can improve group work by involving group members in the evaluation of their own and others' contributions (Johnson and Johnson, 1999). However, there remains some ambiguity about whether or not to assess group work products based on individual contributions or group outcomes. Keppell, et al., investigated three cases of technology-enhanced courses at the Hong Kong Institute of Education. Their findings regarding the effectiveness of the assessment strategies used in the university courses caused them to argue that:

> We are sending students inappropriate messages when we ask them to cooperate in a group to create a group project and then turn around and ask them to formally assess the contribution of each individual member within the group. What we need to do is emphasize the group output or collective output and encourage students to provide peer feedback in developing the output (Keppell, et al., 2006, p. 462).

Other researchers caution that group rewards may result in problematic group function. Some worry that "they may lead students to place extrinsic value on cooperation and learning; students may help each other only as the means to an external reward rather than valuing helping each other and learning for their own sakes" (Webb & Palincsar, 1996, p. 857). Some of these differences may be attributable to cultural norms and expectations related to how people can and should be rewarded for their mutually secured accomplishments. More research is needed in order to determine optimal structures for assessing group work.

Another of the many considerations that must be addressed when integrating technology to support collaborative learning environments is the role that the technology is expected to play. The subject of designing effective group learning experiences

becomes ever more complicated when one considers how technologies affect the very environment in which students gather to learn. Affordances and limitations will change based on whether or not students are collaborating *through* the technology or *around* the technology (Crook, 1984). Will the technology be the medium for collaboration? Will it host the learning environment? Or, will the technology be integrated into a face-to-face environment as one of the many tools involved in learners' collaborative experiences? More and more often, students are learning in courses and classrooms that combine online and face-to-face elements. Thus "Blended approaches can be seen as an important trend in higher education today" (Laferriere et al., 2005). Blended courses incorporate both online and face-to-face modes of communication. Because of the popularity of this model, it is important to insure that we investigate kinds of communications that occur in both modes involved in blended learning.

Nicol and MacLeod (2005) discussed the affordances provided by different tools used by instructors and students in a blended learning course. They noted differences in how the students interacted online through groupware and around shared laptop computers in project based group work in an undergraduate engineering class. Groupware was more often used to support effective exchange of information online. On the other hand, students reported that shared rather than individual laptops provided a valuable focal point for anchoring their face-to-face small group meetings. Laptops then, facilitated face-to-face discussion about the information that had been exchanged online. The findings led researchers to further conclude that the groupware (software) and the laptops (hardware) supported two different types of collaboration.

Zsuzsanna Abrams offers evidence to support and elaborate on their claims. She examined the communication of students enrolled in seminar on research methods in the field of applied linguistics. The course blended face-to-face meetings with what the

author called asynchronous computer-mediated communications (ACMC). She found that the different modes of student communication supported different kinds of student interactions. The two mediums "served different social and intellectual purposes in the process of practicing critical thinking. While face-to-face exchanges were preferred when discussing previous research, only in the ACMC context [did students feel comfortable enough to] critique each other's work" (Abrams, 2005, Abstract, para. 1).

Fortunately there is evidence that technology can have positive implications for students working in groups, even in spite of the numerous complications just discussed. The Lou et al. (2001) meta-analysis found that using technology in small groups of students was more effective than using technology with individual students. They claim that effectiveness of instructional technologies can be enhanced when it is used by groups of students combining their intellectual efforts and students benefit as a result. As Lou et al. indicate "When working with CT [computer technology] in small groups, students in general produced substantially better group products than individual products and they also gained more individual knowledge than those learning with CT individually" (Lou, Abrami & d'Appolonia, 2001, p. 476). Much more information is needed in order to determine how to make the most of new technologies and new approaches. Again, this meta-analysis suggests that incorporating collaboration into learning tasks that involve technology may boost the effectiveness of that instructional technology. The studies included in that review bring good news to educational institutions and systems that have already invested considerable time, effort and funding to make technology an everyday tool in classrooms. But if, as Lou et al. claim, the social context plays and important mediating role they also provide justification for further inquiry that scrutinizes more carefully what students are doing during group work that requires CT.

In sum, technology and collaboration share a complex partnership that is more and more prevalent in teaching and learning. However, designing these experiences is a complicated process- one for which instructors are too often under-prepared. Designing collaborative experiences supported by technology is challenging due to the many factors that influence the group dynamics involved in collaboration. When group dynamics are dysfunctional due to insufficient support or preparation, learning suffers. Fortunately, when technology and group work are married successfully they can ultimately be of benefit students. We need more information to increase the effectiveness of the tools and approaches incorporated in technology rich collaborative learning. Because collaborative approaches emphasize interaction between learners, we also need research methods that are particularly suited to analyzing these interchanges. Discourse analysis is an excellent fit for the task. It is an approach to data analysis that allows researchers to scrutinize interactions in great detail, revealing subtleties that are easily overlooked by other approaches to empirical inquiry.

DISCOURSE ANALYSIS: RESEARCH METHODOLOGIES AND PRACTICAL USES IN EDUCATIONAL SETTINGS

Although approaches to discourse analysis vary widely, this study has been most influenced by researchers who study on communication produced by the whole body. Charles Goodwin is but one example of a group of researchers building on literature that investigates aspects of fully embodied communication such as the role of gesture, posture, gaze, and the use of tools in human communication. Researchers like Streeck, Kendon, and Schegloff concentrate on how the bodies of interlocutors interact with one another and the tools in their surround in order to co-construct meaning. Examining Goodwin's work provides an opportunity to consider the theoretical principles, analytic framework, focus, and procedures involved with this discourse analytic approach.

While most researchers draw on an eclectic mix of theories and assumptions in their work, socio-constructivist theories heavily influence Goodwin's perspective. One can discern the influence of socio-constructivist thinkers such as Lev Vygotsky in several of his scholarly articles (Goodwin, 1994, 2000, 2003). Vygotsky (1978) held that learning is an inherently social process. In articles like, *The Semiotic Body in Its Environment* (2003) and *Professional Vision* (1994), Goodwin emphasizes how participants in communication co-construct meanings by interacting with one another and the artifacts involved in their environment. From Goodwin's perspective, knowledge and meaning are primarily gained and interpreted through social and cultural processes and settings.

Goodwin's analytic framework differs from some other sociolinguistic researchers as well. Rather than gathering and analyzing larger segments of interaction and focusing primarily on the role of words and/or talk in meaning making, his approach is microanalytic. Goodwin is concerned with analysis of small segments of interaction- but that analysis takes on great detail. Goodwin scrutinizes smaller segments of interaction, including moment by moment descriptions about how participants align their bodies with one another, how they orient themselves around the artifacts and tools with which they work, and how they draw attention to salient features of their communication with gesture and gaze. As a result, the focus of Goodwin's work is more concerned with how speech is mediated and expanded upon by communicative elements produced by hands, arms, fingers, eyes and the objects they manipulate or draw attention to.

Discourse analysis that focuses more on speech and words in communication is very valuable. Yet the growing literature on bodies and the tools they use in co-communication also has much to contribute to our understanding of face-to-face educational settings- particularly those that are infused with instructional technologies.

Recall that Nicol and McLeod (2005) found that using shared laptops in an undergraduate engineering class led to unexpected benefits for students who were collaborating around the technology. These authors call for further investigation detailing exactly how the laptops served to anchor and enhance face-to-face communication in the group work demanded by the course. Examining vocal and non-vocal behaviors of groups working with a technology such as a laptop computer may be particularly helpful. One of the main differences between textual online communication and face-to-face interaction after all, is the participants' access to visible, physical and/or non-vocal cues (such as posture, pointing, gesticulation and facial expression). Is it possible that this difference is partly responsible for the divergent affordances provided by online versus face-to-face modes for student communication as the aforementioned researchers have noted them? Microanalytic discourse analysis can illuminate how people use their bodies and the objects in their environment. Thus, a microanalytic approach may offer a unique perspective regarding how a group of students uses vocal and non-vocal communication around a tool such as a laptop computer. The current research study assumes that it is important to know more about how instructional technologies function as objects used in communicative processes. This knowledge can both shape and reveal the subtleties of physical interactions with classroom surroundings and objects and their impact of on teaching and learning.

Gesture is one example of non-vocal communication shaping interaction in classrooms (Roth, 2001). Consider that gesture has been shown to be a crucial aspect of speech production and comprehension in general. For example gesture "aids the listener as well as the speaker and . . . has a direct effect on listener comprehension, independent of the effects gesture has on speech production" (Driskill & Radtke, 2003, p. 445). If gesture is an integral part of the cognitive work involved in both creating and interpreting

speech, then it is likely to play an integral part in the process of learning and understanding. Unfortunately, researchers in the field of education have been slower to recognize the importance of gesture studies and their potential to help us improve teaching and learning. According to Roth (2001) "there exists virtually no educational research that focuses on the role of gestures in knowing and learning and the implications they have for designing and evaluating learning environments" (p. 365). Furthermore, he laments "The few existing studies that do focus on gesture in an educational context, often [are] appearing in journals whose primary focus is not educational research" (Roth, 2001 p. 365).

There are a handful of pertinent studies that I describe in the next pages. Several published research projects have revealed that there is a tendency for people to attend to non-vocal cues, particularly gestures, in the process of educational assessment. Joanna Wolfe conducted a microanalytic case study of the communication of a student writing group in an undergraduate level technical writing class. By analyzing the participants' speech and gestures, their completed assignments, and group members' interviews she determined that nonverbal elements of communication played a likely role in the students' evaluations of each others work and individual contributions to the group product. More specifically, she found that the group member who gestured most often and most perceptibly, received the majority of the credit for authorship of the collaborative document (as attributed by his peers). However, the body of individual written contributions collected by the researcher revealed that this same member actually contributed the least amount of substantive written content included in the final collaborative document (Wolfe, 2005). At least in this case, a group participant who was particularly active in non-vocal communications received credit where credit was *not* due for their written contributions to the group's work.

Another experimental study revealed that it is not only classmates and peers, but also teachers who use non-vocal cues in assessing the knowledge expressed by students (Alibali, Flevares, & Goldin-Meadow, 1997). Teachers and non-teachers viewed videotapes of students communicating their understanding of a mathematical equation. Adults from each group evaluated the students. Ideas that the children had communicated only in gesture and not in speech were noticed by teachers and non-teachers alike, and subsequently were included in their evaluations of the students. As a result, Alibali et al. assert that "Even without training, adults glean information, not only from children's words but also from their hands," and they use that information in assessing student knowledge and understanding (p. 183). These finding indicate that people already intuitively attend to gesture while assessing learning or knowledge. Overtly directing adults to attend to non-vocal communication was educationally fruitful too. Kelly, Singer, Hicks and Goldin-Meadow (2002) found that "instructing adults to attend to gesture enhances their assessment of children's knowledge at multiple ages and across multiple domains" (p.1).

The Alibali, et al. and Kelly, et al. studies represent important findings. However, both experiments only required adults to attend to the hand gestures of an individual student. Especially when taken in conjunction with the Wolfe (2005) finding that gesture in group communication can at times be misleading and result in incorrect assessments, it is important to know more about what instructors or collaborative group members attend to when they assess and contribute to assignments. Clearly, gestures are an integral portion of the task in which people engage when they interface to make and assess meaning together in a learning environment. Still, gestures are not the only components of non-vocal communication that occur in face-to-face collaborative work. The means of communicating ideas within a group, and also the cognitively challenging process of co-

developing, organizing and capturing ideas in text during collaborative authoring involves much more complex and varied forms of non-vocal correspondence that requires further study.

Consider that researchers have suggested that non-vocal forms of communication extend beyond the movements we create with our hands, arms, and facial expressions. Some have asserted that we communicate a great deal by the postures and general physical orientations we adopt in relation to one another (Kendon, 1973, 1981); the way we arrange our bodies in a built or existing cultural space (Lebaron & Streeck, 1997); and even the way we place and position objects that are the subject of our verbal communication (Clark, 2003). These discoveries have been made by examining general patterns of human communication in a wide variety of everyday settings amongst many cultures. What insights do we stand to gain by closely scrutinizing what happens specifically in educational communications- and particularly those that involve technology?

Fortunately, interest in the importance of the physical relationships between people and their technological tools is rising. Academics are beginning to recognize that these physical relationships do influence how people work not only with their tools, but with one another as well. Bielaczyc (2006) identifies these aspects of interaction around a technology as one of the four "Critical Issues in Creating Learning Environments With Technology" (p. 301). The third of her four basic dimensions of classroom design is,

> The *socio-techno-spatial relations dimension* [which] refers to the organization of physical space and cyberspace as they relate to the teacher and student interactions with technology-based tools. The various arrangements among humans, computers, and space within a particular classroom context impact they dynamics of the learning environments created. This dimension becomes even

more interesting with the introduction of wireless handheld devices that permit mobility and modularity. This dimension influences accessibility, connectivity, and communication among students and teachers (Bielaczyc, 2006, p. 304).

Few studies in the field of IT have addressed the many non-vocal or *socio-techno-spatial* factors affecting collaborative work that involves technology. Some begin to scratch the surface of non-vocal issues involving who is in control of the educational resources used in completing a task. Resource control is a factor that appears to affect Computer Supported Face-to-Face Groups composed of young and adult learners alike. Gordon Wells cites research on computer use in elementary age classrooms by Wegerif (1997) noting that in he found "if one participant has greater access than the others to a critical artifact such as… a computer keyboard, that participant is likely to play a more central role in determining how the activity proceeds" (Wells, 2000, p. 315).

Austin, Liker and McLeod also investigated issues of technological resource control- but they studied groups of adults working on a rank-ordering task in a computerized meeting room. With the touch of a button, all participants had the ability to take control of a shared computer with a large public monitor. They found that "Groups adopted either a dedicated-scribe strategy, in which one member had control throughout the session, or a non-dedicated-scribe strategy, in which control of the public monitor passed among members" (Austin, Liker, & McLeod, 1993, p. 217). The authors also concluded that the control strategy selected by the group was related to other aspects of group dynamics such as gender, social influence, and technical competence. Furthermore, they noticed that discussion amongst members about the control strategy, (or lack thereof), seemed related to the strategy the participants adopted.

The authors deemed the meeting room a "low structure" environment- meaning that the group support system in the room "does not incorporate any particular decision-

making methods" (Austin, Liker, & McLeod, 1993, p. 219). However, the meeting room in their study still provided a built-in mechanism whereby participants were able to access control of the shared computer. In the current project, groups had no system nor any established rules or norms governing how to share or allocate control of the laptops as authoring tools. How is this related to group dynamics and functioning in the process of collaborative authoring? Did this difference have any effect on the kinds of control strategies adopted by the groups? Although it is seldom addressed in literature on collaborative learning with technology, it seems important to consider questions of control such as "who will operate the public computer, enter data, access the computer programs, decide what programs to use, and the like, and what are the implications of various ways of allocating control?" (Austin, Liker, & McLeod, 1993, p. 219).

Answers to these kinds of questions can emerge from engaging in closer analysis of the gestures and other non-vocal communications that appear in small group collaboration around instructional technologies. Fine-grained analysis of the nonverbal aspects of student interaction with and around technology can help us develop more concise investigations about the functions these non-vocal aspects serve in small group work. Qualitative studies such as this can build on a foundation of knowledge about non-vocal communication that allows us to identify further questions to be addressed in future experimental studies. Non-vocal communication provides a physical, visible bridge between the thoughts, speech, and tools employed by learners in their learning environment. I argue that investigating those connections results in more detailed understanding about the role that instructional technologies play in the intricate process of collaborative teaching and learning.

CHAPTER THREE

Methods

RESEARCH PARADIGM

Throughout my research I attempted to adopt a "paradigm where the observer, rather than be a purely external observer to the systems [s]he studies, is invited to acknowledge that [s]he, too, is a system, an observing system" (Scott, 2001, p. 27). During data collection and review I employed qualitative analysis of vocal and non-vocal communication to shed light on the nature of discourse in computer supported collaborative authoring. I privileged the "Situative/Pragmatist-Sociohistoric View" of learning that highlights "aspects of the social practices of sense-making and learning, a rich variety of social and material resources for learning and [contributions] to socially organized learning activities, as well as [engagement] in concentrated individual efforts" (Greeno, Collins & Resnick, 1996, p. 27).

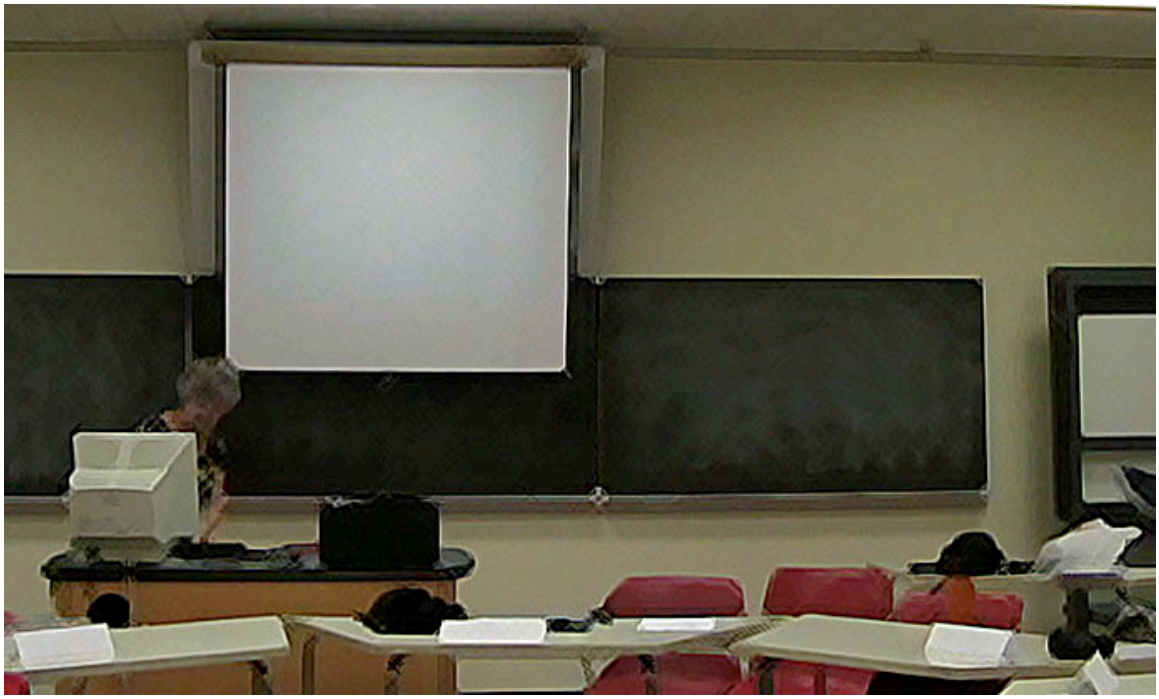
RESEARCH SETTING

In the Fall semester of 2006 I collected paper-based, web-based and videotaped data generated in a graduate level course concerned with research on teachers and teaching. The course was an example of a blended learning environment offered by the department educational psychology within the college of education at a large public university in the south. Generally between 15 and 25 graduate students from various departments within the graduate school of education participated in the course each fall.

The classroom environment contained elements familiar in traditional post-secondary classrooms, but also included resources to support a web-based classroom. All descriptions of the room and of participant's positions in the room assume the perspective

of a person standing at the entrance to the classroom in the back, left-hand corner of the room looking forward as in Figure 3.1.

Figure 3.1 Classroom View



Three large blackboards lined the front wall. A manually retractable projection screen hung from the ceiling at the front of the room. The screen was regularly pulled down in front of the boards for presentations. The classroom was equipped with an overhead transparency projector, as well as a maneuverable technology station that accommodated a computer, keyboard, mouse and projector.

Seating was accommodated by modular trapezoidal tables and plastic chairs that were rearranged into and out of parallel rows. Often, the tables were organized into one large circle in the middle of the classroom to facilitate large-group discussion at the beginning and end of class. To facilitate collaboration and authoring the instructor and

the students arranged small groups of tables in separate areas of the room. The room was equipped with wireless Internet access. Students were encouraged but not required to bring a notebook computer to class. According to the instructor the class required enough laptops that each small group would have one laptop on which to compose their weekly presentation. The course met face-to-face every other week in the shared physical space of the classroom, and also online in the alternating weeks in a virtual space on Blackboard, the courseware website.

Students enrolled in the class were divided into two cohorts focused on educational research, theory and practice in 1) K-12 and 2) post-secondary settings respectively. Both cohorts met together in the classroom for the first two weeks. They did not meet again in the classroom until the final week of the course. However, the two cohorts met together once in the online discussion forum mid-way through the semester. During the remaining weeks of the course each separate cohort alternated between face-to-face meetings in classroom one week, then online in the discussion forum the next.

The course operated as a learning community wherein the students and professor shared responsibility for generating course content and organization. The instructor divided course content into three broad units of study. Students chose their own subtopics for investigation within the three units. The professor provided a course reading list through electronic reserves, but students also identified pertinent research for reading. Participants gained an understanding of this course material through both individual and collaborative learning activities.

Each broad unit of study spanned three weeks devoted to a particular aspect of the process of teaching and learning. Unit one was entitled "The interaction of teaching and learning" (Course Reading List, 8/30/2006). Unit 2 was called "Teachers' characteristics, beliefs and attitudes and their impact on teaching and learning" (Course Reading List, 8/30/2006). The title of Unit 3 was simply "Faculty Development" (Course Reading List, 8/30/2006). At the beginning of each unit all students worked as a large group to identify subtopics for the unit. In subsequent weeks, they divided into small groups according to personal interest in the subtopics they had identified. Each week at least one group member volunteered to serve as the topic leader. However, all members of the small groups sought information and resources related to that week's subtopic. Group composition changed weekly. Group membership was based on students' prior decisions about which topic was most relevant to their professional interests.

Once subtopics and small groups had been identified, students worked online for a week before their face-to-face class meeting. During the early portion of the week students were expected to locate pertinent research using the course reading list and other searchable databases. Next, they posted summaries and responses about the readings and articles they identified. During the middle of the online week students were expected to read and respond to their classmate's posted messages. In other words, during one week students conducted literature searches, read research articles, posted summaries and responded to at least two other classmate's postings. The next week students met face-to-face in their classroom to synthesize their postings, engage in computer supported collaborative authoring and present their work to the whole class.

Each face-to-face class session followed an informal pattern that included: 1) whole class greetings and opening discussions; 2) computer supported collaborative authoring in small groups; 3) a short break time; 4) presentations of assignment documents; 5) and closure of the class. During whole group discussions participants clarified topics, terms and instructions before members divided into small groups. Once divided, groups were given approximately an hour to discuss, synthesize and author a presentation document that summarized research they had identified and read during the preceding week. I refer to this portion of the class as the CSCA hour or CSCA time. After students created their collaborative document they uploaded it to the online discussion forum. During the final hour of their face-to-face class session the collaborative documents were projected onto the screen at the front of the room and were presented visually and vocally to the whole group. Subsequently the presentations were open for large group discussion.

In summary, the interest sections met online every other week, sought and summarized pertinent research then posted messages and responses in the discussion forum. The following week the interest groups met face-to-face to author and present their assignment documents. Then the assignment cycle began again for the next subtopic included in the current broad unit of study. The broad unit of study drew to a close after three weeks. At that time, students were required to write individual summaries of what they learned during the broad unit of study. These assignments were turned in via e-mail directly to the instructor. Then the next broad unit of study began. During the final weeks of the semester, students were required to complete and present an

individual or group project that consisted of either a research paper or research study that addressed some aspect of the course content.

PARTICIPANTS

The Psychology of Teachers and Teaching was designed and facilitated by Dr. Madelia Ossem. At the time of data collection Dr. Ossem was known for her expertise in post-secondary teaching and had received accolades for her work in that area. She was active in several relevant professional organizations, served as editor of two refereed research publications and was involved in guiding several graduate student research groups before, during and after the semester of data collection. She was regarded as quite knowledgeable with regard to her subject area and sophisticated in her ability to conduct and evaluate research. Madelia also had a reputation as an excellent researcher, teacher and mentor.

Twelve master's and doctoral level students, aged between 25 and 35 years participated in the course. There were five males and seven females in the class. The names they used in face-to-face authoring sessions did not always exactly match the names that they were assigned (by the university) to use in the online discussion forum. Presumably these differences stemmed from their use of nicknames, middle names, or shortened versions of their names for face-to-face interactions with students and professors. As a result of this disparity, participants in the class had to familiarize themselves with their classmates' face-to-face and online personas. In some cases, they also had to discover the connections between the online name associated with discussion

forum postings and the person they knew from class. The following excerpt from the transcription of one of the authoring groups showed this process of connection in action.

Stuart: Yeah who posted that one?

Renea: Jessica

Stuart: That's you? JDOE 1243?

Renea: Yes.

Jessica: ((Humorously)) That's my name.

Coupling a face-to-face and online presence was an interpersonal task that had to be accomplished in this blended environment, even between two students who knew each other well offline and after almost a month into the course. Their face-to-face and online names are listed in Table 3.1.

Table 3.1 Student's Online and Face-to-Face Names

Face-to-face Name	Online Name
Annie	Jun-An
Ellyn	Ellyn
Jacob	Jacob
Jessica	JDOE 1243
Laney	Laney
Marcella	Marcella
Max	Maxwell
Mitchell	Mitchell
Renea	Renea
Shannon	Li-Shen
Stuart	Stuart
Will	Robert

DATA COLLECTION

I gathered a sizeable data set to maximize opportunities for effective qualitative analysis. My goal was to create an extremely thick description of the course materials,

setting, participants and the discourse they created (Geertz, 1973). Sources of data included the researcher's observational field notes, video taped footage of classroom interactions (both whole class and small computer supported collaborative authoring group interactions were recorded), expanded field notes based on the content of the taped footage, transcripts of computer supported collaborative authoring group interactions (transcripts were generated by the researcher), student and professor postings to online course website pages, hard copies of materials given to students in face-to-face meetings and any other electronic correspondence sent to students by the instructor and one another. Specific information about sources and methods of data collection are detailed below.

During the first face-to-face meeting of the course, I provided consent forms to all students and all students gave their consent to participate. Data collection began immediately and continued over the duration of the entire semester. The researcher attended weekly face-to-face class sessions and had real time access to student and instructor postings in the discussion forum. Each week, I received hard copies and electronic copies of all materials given to students. These included the course syllabus, reading lists, weekly agendas and any additional correspondence sent by email.

Video recording equipment was delivered to the face-to-face classroom each week. Equipment consisted of four video cameras placed on tripods around the classroom. I provided one camera that I was able to position and prepare for recording prior to the beginning of the class session. This camera recorded class discussions and questions prior to the CSCA hour. My camera also recorded footage of the presentations of the assignment documents following the authoring hour. The three remaining cameras were provided by the technology resource center in the education building. Resource center policies prohibited the delivery of this recording equipment prior to the official

start time of the class. Therefore, I prepared and placed these cameras around the room as soon as the technology resource center staff delivered them. When participants had rearranged themselves and their classroom environment to facilitate CSCA I positioned cameras by the table clusters where small group work occurred. Recording began as soon as cameras were prepared, as quickly as possible when small group work commenced.

While cameras recorded the small groups engaged in collaborative synthesis and authoring activities I sat in the front-right-hand corner of the room with visual access to all CSCA groups. While the groups engaged in CSCA I typed observational field notes on my personal laptop computer. I paid particular attention to the vocal and non-vocal activity within the small groups. Field notes included observations of turns at talk, bodily postures and the physical formations of the groups, gestures, physical reorientations of the group, and physical interactions with the authoring technologies used by students- especially the laptop computers.

I also had access to online communication generated by the students and course instructor. These included the e-mails, messages posted in the online discussion forum and links to articles or resources identified by students and shared between class members. I created and saved electronic copies of all available postings to online course forums and other electronic messages for ongoing reference.

ANALYSIS

My microethnographic approach to data analysis resulted in a detailed description of the community that emerged amongst the students within the confines of one course over one semester. This study was sociolinguistic in that it revealed how the learning community both consisted of, and emerged from, the vocal and non-vocal interaction of course participants. I employed inductive data analysis following the constant

comparative method (Glaser & Strauss, 1967). Initially, categories of communicative utterances and bodily behaviors emerged from the data. Subsequently, categories were compared with new data and revised until they were as mutually exclusive as possible.

A grounded theory approach to analysis eventually culminated in a model that reflected the communication that occurred over the course of the semester during CSCA. Within the next chapters I build a visual representation of this model piece by piece to aid the reader in understanding the separate components incorporated therein. In many ways, the growth of the pictorial representation of the model does parallel the way in which my understanding emerged throughout data analysis. However, it is essential to note that my understanding of the data did not reach the level of visual organization shown in these components or in the final model until the latest stages of my study.

Broad-Scope Analysis

In this chapter I describe the methodology involved in progressively narrowing of the scope of analysis from very broad to highly specific. In the following pages I chronicle how I conducted: 1) a full review of both taped and text based data, 2) selection of cases, 3) selection of software package used for data analysis, 4) creation of transcripts and early coding schemes, and 5) preliminary coding of video based data.

Inductive analysis following the constant comparative method, (Glaser and Strauss, 1967), was guided by three main research questions. In what ways do participants negotiate group roles and responsibilities? In what ways do participants allocate control of, and share access to laptops used during CSCA? And finally, what is the nature of verbal and nonverbal discourse in computer supported collaborative authoring (CSCA)? Data analysis began with broad scope review of all available data, creation of expanded field notes, and emergence of initial theories about the research questions and early development of emergent coding schemes. My analysis narrowed

progressively through case selection and creation of transcripts. I performed microanalysis of three selected cases using increasingly refined coding of video timelines while reviewing and identifying linkages between face-to-face discourse and online interaction. I performed even more fine-grained microanalysis of one selected brief segment of interaction in case two.

Upon the termination of the semester and the completion of the course, I began the process of digitizing the taped video footage of classroom interactions into iMovie software. I viewed approximately 51 hours of video recordings as data were imported. I wrote expanded field notes on the footage of CSCA groups during their authoring time. Once footage was digitized, I also fast-forwarded through the footage to identify where noticeable shifts or changes in the physical composition or behavior of the groups had occurred. Reviewing segments of footage in this fashion began to reveal commonalities in the different kinds of physical behaviors that occurred during the authoring process, particularly in relation to the assignment document itself. My expanded notes consisted primarily of a record of the talk in the authoring hour. They also included an early listing of the strategies participants appeared to use to engage with the assignment document.

I also kept informal written accounts of the composition of the CSCA groups in each face-to-face class meeting. I listed the group members with notations about who had personal laptops available and who functioned as the scribe in each group. I referred to this outline repeatedly throughout data analysis and even in the process of writing about my findings. My outline showed the following information about each class: the number of groups that day, the number and names of participants in each group, the personal computers available and the typist for each group. As the outlines of group composition in each of the two cohorts (that focused on K-12 and Post-secondary education respectively) grew, they revealed gaps in the data set for the K-12 cohort. For example,

one week I was absent from data collection in the face-to-face class meeting of the K-12 cohort due to a documented case of illness. In two other K-12 cohort class sessions, student and professor absences prompted the class to engage in one large group discussion rather than divide into CSCA groups. I chose to focus on the data generated by the post-secondary cohort. This data source was more comprehensive and there were simply more examples of CSCA activity available for analysis. Henceforth when I refer to participants, class members, class sessions or CSCA groups I am speaking only of the members of the post-secondary cohort. All of the cases, coded data and all of the online materials included in the following detailed analysis, findings, and implications chapters are taken from the post-secondary education cohort of the class.

As I progressed in the initial review of video footage and creation of expanded field notes, I turned my attention to the issue of case selection. I continued to scrutinize the outline of group composition throughout this process. It provided answers to questions that helped me consider patterns in the groups' functioning such as, "Who was the typist more than once?" "Who never assumed the role of typist?" and "Of the class members who never functioned as typist, which ones never brought a personal laptop to the class?" These initial questions guided my selection of cases for further analysis.

Early ideas about strategies that students used to engage with one another and their assignment were emerging from my broad review of the data. I created a diagram, conceptualizing the ways in which students negotiated access to their assignment. I questioned and if and how these strategies were related to one another. My earliest pictorial representation revealed that participants' communication strategies clustered around two main categories. Originally I identified these as either verbal or nonverbal strategies. I knew at the outset of this project that I was particularly interested in the non-verbal interactions of group participants with each other and their computers. Groups

that displayed a variety of physical behaviors or groups that illuminated if, when, and how students managed access to the computers during authoring were more likely to be selected for detailed analysis.

Nonetheless I systematically considered several approaches to case selection. I created a comparative inventory of the benefits of different approaches to case selection. Factors I considered in this inventory included the quality of audio and visual footage captured, the diversity and quantity of strategies used to engage with the assignment document, the amount of footage available for review, chronological considerations about when the CSCA group was filmed, and the number of class members represented in the cases selected. I believed that ample, high quality footage would be most likely to yield accurate transcripts and coding. Therefore I determined that the best approach to case selection would be to privilege high audio-visual quality as well as ample quantity of footage. I chose CSCA authoring groups that were recorded by more than one camera, that were easy to see and hear, and those that had interesting content with respect to the group's interactions.

Case Analysis

I selected, transcribed and coded *the community group* because it offered opportunities for identifying multiple complexities and categories of human interaction with and around technological tools. Two different cameras recorded this group's interactions so audio and visual quality was intact. The group incorporated a wide variety of vocal strategies as well as some especially interesting non-vocal strategies during CSCA. I began by creating a transcript of the talk recorded during the authoring hour. Although the first portion of the transcript was created in Microsoft Word, peer debriefing led to my discovery of Studiocode. This software package promised to be a powerful tool for transcribing and analyzing video based data. I procured a license to use

the software and began the process of digitizing the taped footage. (My existing digital copies of video could not be exported/imported into the new software.)

Studiocode software also provided a useful tool that looped video footage and streamlined the process of creating a transcript. I knew that eventually I would indicate and analyze instances of non-vocal interactions in the Studiocode software. Therefore I transcribed only minimal notes about bodily interactions that were particularly noticeable, communicative or integral to the authoring tasks. My transcripts functioned primarily as textual representations of the vocal interactions of group members. I transcribed talk adapting a method developed by Gail Jefferson (Sacks et al., 1974). I added comments or notes about important physical behaviors in double parentheses. I used punctuation to transcribe intonation. Goodwin (2000) described this method was quite effectively saying,

> A period indicates falling pitch, a question mark rising pitch, and a comma a falling contour, as would be found for example after a non-terminal item in a list. A colon indicates lengthening of the current sound. A dash marks the sudden cut-off of the current sound (in English it is frequently realized as glottal stop). (p.158)

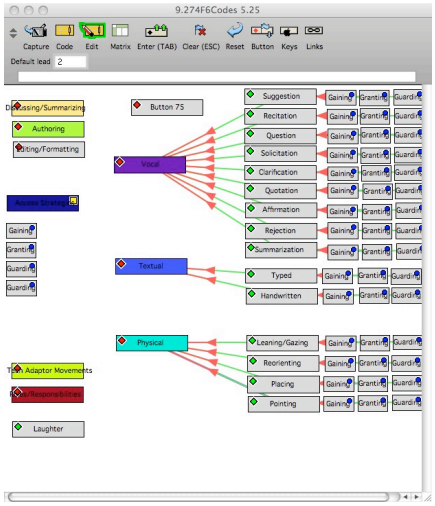
I also reviewed contributions to online forums. My goal was to determine if and how the online and face-to-face modes of communication were related to one another and to CSCA.

Coding the timelines

Studiocode allowed me to create code input windows with customized codes specific to my project so that I could mark applicable instances in a timeline. At this point in the broad-scope analysis phase I had already determined that students used a variety of strategies for negotiating entry into their assignments. I had already begun to

identify patterns in their communication and organize my understanding of their strategies into categories and subcategories. I created several iterations of code input windows as my understanding of vocal and non-vocal strategies for engaging with the assignment emerged and evolved. Figure 3.2 shows the first code input window I created. This code input window combines all categories and subcategories in the same pane. It includes categories that were later eliminated or altered. The arrows were not necessarily indicative of relationships between concepts, but instead were activation links between coding buttons.

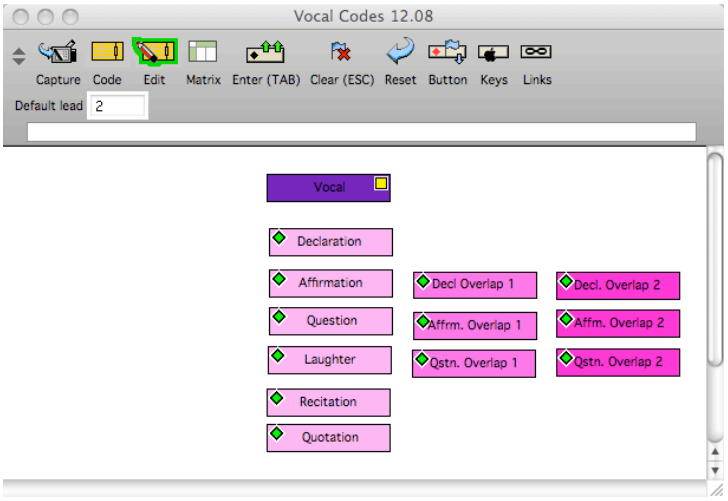
Figure 3.2 Early Code Input Window



My understanding of the CSCA groups' discourse gradually became more complex. Meanwhile my ability to use the Studiocode software improved. For example, I had learned how to create color-coded clusters within the timelines by separating the categories of entry strategies into their own code input windows. I created a code input window that included only vocal codes. I also found it cumbersome and inaccurate to use the activation links while coding my timelines. I did not use activation links in subsequent code input windows. The absence of arrows in the new windows did not

necessarily suggest an absence of relationships between the subcategories used for coding the timeline. Figure 3.3 shows this code input window.

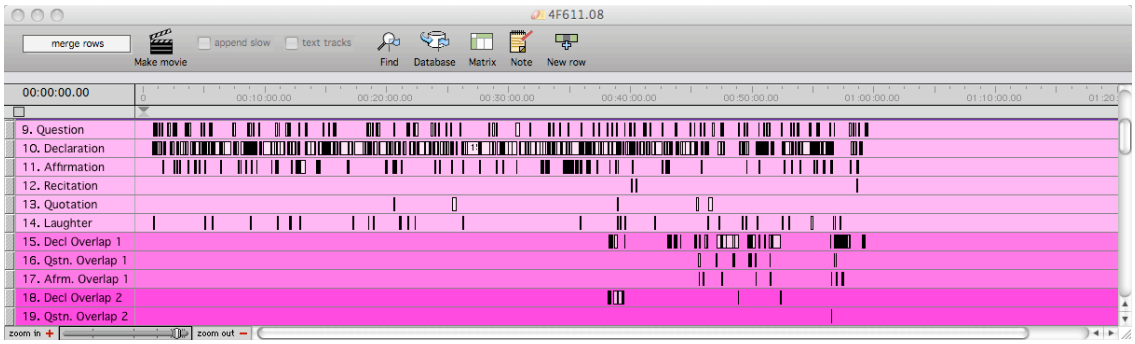
Figure 3.3 Early Vocal Code Input Window



Coding vocal entry strategies

I furthered my transition from broad-scope analysis to more fine-grained consideration of the data by viewing the video footage and coding instances of vocal entry strategies into a timeline. Figure 2.3 shows the earliest timeline I coded for the community group. Timelines could be expanded to scrutinize individual codes in detail, or compressed to show all of the codes over the entire vide recording. The timeline in Figure 3.4 was compressed to include all of the vocal entry strategies that occurred over the entire CSCA hour. Note that many of the coded instances occurred at the same time. Markings in the progressively darker lines reflect how conversations within authoring groups sometimes overlapped.

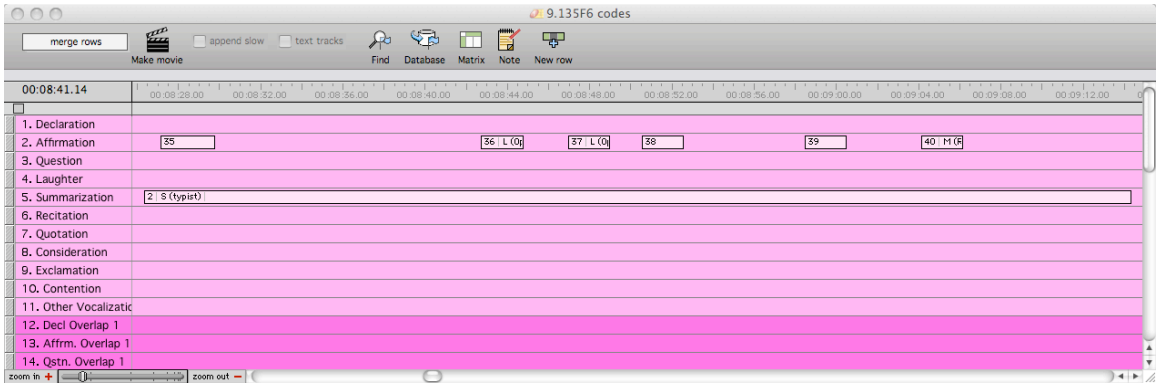
Figure 3.4 Early Coded Timeline



Participants' utterances overlapped one another, particularly when group size exceeded three members. When the content of overlapping talk indicated that at least two separate conversations occurred concurrently I coded speech involved in the separate conversations in different "clusters" of the Studiocode timeline. I arranged coding in clusters by creating new buttons within the Studiocode code input window. These code input buttons separated concurrent conversational threads as "Declaration Overlap 1"; "Declaration Overlap 2", and so on. I color-coded the code input buttons to set apart overlapping conversations in the timeline. Conversations directly focused on the authoring of the assignment document were coded in the first cluster of the timeline. Instances were coded in the lightest colored lines within the timeline. Increasingly dark coding lines represent how subsequent threads of conversation appeared in CSCA discourse, and how their focus was increasingly removed from the primary authoring conversation. The image above shows an example of the Studiocode timeline with progressively darker conversation clusters. I determined that a new thread of conversation had appeared by attending to several factors. I noted the participants engaged in communication with one another, I observed their apparent shared conversational space and listened for the content of their utterances.

Occasionally participants' talk would overlap while they were engaged in discourse around the same topic. In other words, talk overlapped even when participants are all talking about the same thing. For example, many participants would utter an affirmation that overlapped another speaker's contribution to the discourse. As long as the instances of vocal strategies were from two different categories of vocal strategies, I coded the instances when they began and finished. I coded the affirmation in the same color-coded conversation cluster as the declaration. However, the declaration appeared in the declaration coding line and the affirmation appeared in the affirmation coding line. This kind of overlap is evident when observing the coded instances in the Studiocode timeline. Figure 3.5 below represents one group member's extended turn at talk, in this case a summarization, during which several other group members offered overlapping affirmations. A long turn at talk that is overlapped by affirmative utterances was a recurring form of overlapping talk in CSCA.

Figure 3.5 Overlapping Talk in the Coded Timeline

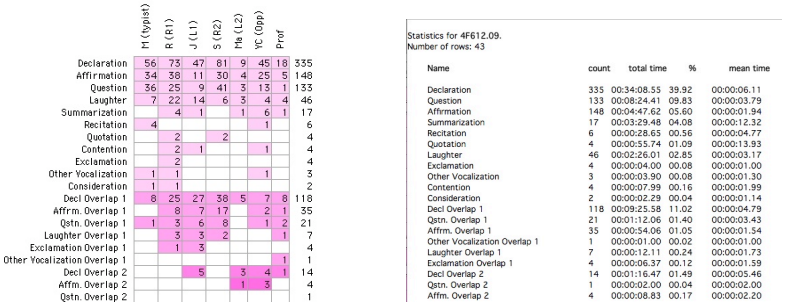


Sometimes participants' talk within the same conversational cluster would overlap and both instances fell into the same coding category. For example, two group members sometimes uttered an affirmation simultaneously. In that case, the utterance that began first was coded in the primary conversation cluster and the overlapping talk

was coded in the "Affirmation Overlap 1" conversation cluster of the Studiocode timeline.

Coded timelines allowed for visual representation and consideration of the number of each kind of vocal strategy used during CSCA and their distribution across the authoring hour. Furthermore, Studiocode allows researchers to search the timeline(s) for coded instances and view instances from a particular coding category. Studiocode offered several different ways to consider the coded instances in the data set. I had access to information about the frequency and duration of each coded instance of the different strategies exhibited in the taped footage. Studiocode software compiled this kind of quantitative information about coded instances into matrices and data output files like those pictured in Figure 3.6 below.

Figure 3.6 Studiocode Output Files



	M (typist)	R (R1)	J (L1)	S (R2)	Ms (L2)	YC (Opp)	Prof	
Declaration	56	73	47	81	9	45	18	335
Affirmation	34	38	11	30	4	25	5	148
Question	36	25	9	41	3	13	1	133
Laughter	7	22	14	6	3	4	4	46
Summarization		4	1		1	6	1	17
Recitation	4					1		6
Quotation		2		2				4
Contention		2	1			1		4
Exclamation		2						4
Other Vocalization	1	1				1		3
Consideration	1	1						2
Decl Overlap 1	8	25	27	38	5	7	8	118
Affrm. Overlap 1		8	7	17		2	1	35
Qstn. Overlap 1	1	3	6	8		1	2	21
Laughter Overlap 1		3	3	2			1	7
Exclamation Overlap 1		1	3					4
Other Vocalization Overlap 1							1	1
Decl Overlap 2			5		3	4	1	14
Affm. Overlap 2					1	3		4
Qstn. Overlap 2								1

Statistics for 4F612.09.
Number of rows: 43

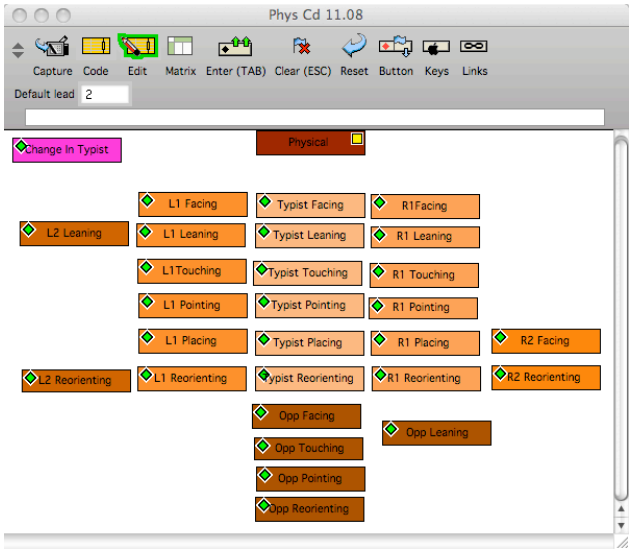
Name	count	total time	%	mean time
Declaration	335	00:34:08.55	39.92	00:00:06.11
Question	133	00:08:24.41	09.83	00:00:03.79
Affirmation	148	00:04:47.62	05.60	00:00:01.94
Summarization	17	00:03:29.48	04.08	00:00:12.32
Recitation	6	00:00:28.65	00.56	00:00:04.77
Quotation	4	00:00:55.74	01.09	00:00:13.93
Laughter	46	00:02:26.01	02.85	00:00:03.17
Exclamation	4	00:00:04.00	00.08	00:00:01.00
Other Vocalization	3	00:00:03.90	00.08	00:00:01.30
Contention	4	00:00:07.99	00.16	00:00:01.99
Consideration	2	00:00:02.29	00.04	00:00:01.14
Decl Overlap 1	118	00:09:25.58	11.02	00:00:04.79
Qstn. Overlap 1	21	00:01:12.06	01.40	00:00:03.43
Affrm. Overlap 1	35	00:00:54.06	01.05	00:00:01.54
Other Vocalization Overlap 1	1	00:00:01.00	00.02	00:00:01.00
Laughter Overlap 1	7	00:00:12.11	00.24	00:00:01.73
Exclamation Overlap 1	4	00:00:06.37	00.12	00:00:01.59
Decl Overlap 2	14	00:01:16.47	01.49	00:00:05.46
Qstn. Overlap 2	1	00:00:02.00	00.04	00:00:02.00
Affm. Overlap 2	4	00:00:08.83	00.17	00:00:02.20

Coding non-vocal entry strategies

When I had completed coding of vocal entry strategies, I also created a code input window with which to mark instances of physical strategies students used to engage with the assignment. Coding was uncomplicated if one student was pointing to the screen while another was typing. These two entry strategies could be coded into two different coding lines in the same timeline. (Much like two different types of vocal strategies could be coded in two different coding lines within the same timeline.) However, two

students would frequently lean toward the screen simultaneously. When this happened I encountered difficulties in marking the timeline with physical entry strategies, and they frequently overlapped one another as group work proceeded. It occurred to me that I should devise a code input window with which to code non-vocal engagement strategies used by each of the individual participants. (Because two students leaning in to view the laptop screen simultaneously could not be effectively coded in one coding line of the timeline without this adaptation being made.) The resulting code input window is pictured below in Figure 3.7.

Figure 3.7 Nonvocal Code Input Window



The nature of the software I had chosen for analysis resulted in a revelation about how to analyze students' physical interaction with the assignment document. I color-coded the input buttons to indicate the participant's proximity to the notebook computer and assignment. Therefore the timelines showed the participant's physical entry strategies and indicated their physical proximity to the laptop computer on which the assignment document was created. Again, the color of the coding lines within the

timeline became progressively darker as distance from the laptop increased. The further away the participant, the darker the code input button and the corresponding code lines within the timeline. The typist's code input buttons caused light orange coding lines to appear in the timeline. The code input buttons for the CSCA group member on the opposite side of the table caused dark orange coding lines to appear in the timeline with corresponding gradations of orange assigned to the participants arranged around the table. The result was a visual representation of the data that was comprehensible and compelling.

This approach to coding the video timelines affected the selection of subsequent cases as certain camera angles were more conducive to this coding scheme than others. In fact I did not code one case that I had already transcribed because the camera did not capture enough footage of two of the group members physical entry strategies. In the end I selected, transcribed, coded, and analyzed the face-to-face and online communication of three CSCA groups. Taken together, the groups included most, but not all of the students enrolled in the class. This sample of the data included peoples of more than one ethnicity and gender. All groups included one or more Caucasian male and female students, and two of the three case groups included Asian female students. Several, but not all of the participants were included in two or more of the CSCA groups that were filmed. This allowed for a comparison of their interactions across groups which helped me consider how some communicative patterns appeared to be more connected to a particular individual participant rather than indicative of a particular group dynamic or a particular physical arrangement. There was also a chronological range of footage represented. Two of the groups were filmed during the first two (out of a total of five) weeks of face-to-face authoring sessions- on September 13th and September 27th respectively. The third group was filmed during the last week of face-to-face authoring sessions.

I must recognize that the cases I finally selected did not comprehensively represent the unabridged range of interactions displayed by all participants over the course of the entire semester. The aim of this research however, was never to generalize the selected groups' experiences to all students who work collaboratively using a technology. Instead, the goal of this research was to explore and describe how human communication was shaped by the incorporation of technology into collaborative authoring. Subsequently I could consider how scrutiny of this discourse might inform teaching and learning in similar settings. Many of the insights gained in the process of this qualitative analysis might then offer high transferability to analogous environments and/or other CSCA assignments.

I did take steps throughout the process of collection and analysis to maximize trustworthiness of the data. I continually reviewed and compared coded timelines of taped footage, transcripts, field notes, online postings and participants' presentation documents to ensure that they aligned with one another and reflected the content of the course syllabus and daily class agendas. I also consulted the course instructor to review and comment on coding, findings and implications. Furthermore, I periodically consulted with an expert peer debriefer who provided feedback about the progress of the research. Debriefing sessions covered many different aspects of the research including emergent codes, case selection, approaches to coding of the timelines, findings and implications of the research.

LIMITATIONS

Non-vocal communication involves socio-cultural limitations. Participants in the course displayed a wide variety of communicative strategies that were influenced by factors such as cultural background, gender, level of familiarity between members of collaborative groups, individual temperaments and styles of communication. Moreover,

my own dialect of standard English shaped my generation of transcripts, coding categories and the data analysis that relied on them. My own understanding of patterns and norms for non-vocal interaction at the time of data collection and analysis were also learned and culturally bound. I made efforts to consult sufficient research on cultural patterns for discourse and embodied communication to illuminate data analysis.

The acts of seeing and viewing were limited by nature as well. Because of the limitations of the human field of vision, observational field notes did not record every interaction that took place in every group during collaborative authoring group work. Thanks in part to ambient noise and overlapping talk, some utterances were not completely audible. Furthermore, camera angles limited my ability to view all of the communicative actions. When groups used more than one laptop computer it was impractical to position enough cameras to fully record all non-vocal instances and their referents on multiple screens. I must also note that using human gestures, postures, gazes, points, and other non-vocal movements as units of analysis presents measurement challenges. (For example, deciding how to code three or four subsequent nods of the head either as one fluid or several separate non-vocal instances.) Thus, any accounting of both vocal and non-vocal discourse must be regarded at least to a certain extent, as an approximation.

On one final note, some technical concerns involved in data collection were also worthy of mention. Digitized video files are by nature large and can be difficult to obtain and store. Limitations of either the researcher's personal laptop or of the Studiocode software itself resulted in minor problems importing the video footage into Studiocode software. As a result, short portions of the video footage were excerpted from the timelines representing the CSCA group's interactions. These excerpts- ranging from approximately15 to 60 seconds in length depending on the case- were still captured by

the original recording, and were not excerpted in the digital copies of the footage that were imported into iMovie software. These excerpts were included in the written transcripts of the CSCA group's vocal and non-vocal interactions and considered during data analysis. I also reviewed the transcripts to ensure that whatever interactions were excerpted by Studiocode were representative of the greater corpus of data. In my judgment their exclusion from the coding did not profoundly alter the conclusions or implications of this research.

SUMMARY OF METHODS

In review, my data analysis relied heavily on the transcripts, coded timelines and data output matrices and frequency output files created in Studiocode software, as well as screen shots excerpted from videotaped footage of interactions. Analysis of footage and accompanying transcripts was inductive and followed the constant comparative method (Glaser and Strauss, 1967). Initially, I discovered categories of communicative utterances and bodily behaviors through the broad-scope review of data. I noted similarities and differences across categories and mapped them conceptually to identify any themes and patterns present.

Once an approach to case selection was applied, I began transcription of the first case. When I had identified early coding categories, I developed code input windows within the analysis software. I began early trials at coding video based data. Throughout the process of transcribing and marking instances in the case timelines, I compared initial coding categories with subsequent encounters with the data. I reconsidered and revised the coding categories, (and the structure of the code input window that I used to code the timelines), until they were as mutually exclusive as possible. Written contributions to online forums were additional sources of data. I frequently consulted these during the

process of creating transcripts and coding the timelines because they helped me to discern and make sense of the talk amongst CSCA participants.

The software I selected for analysis influenced how data was viewed and assessed- most often with positive outcomes. After I completed broad review case selection and early coding, the process of data analysis became more refined and more fine grained. Descriptions of the methodology involved in refined coding of selected cases are intertwined with my broad-scope findings. Therefore I have enfolded the detailed information about additional methodology and analysis in the following Chapters on research findings.

CHAPTER FOUR

Findings From Broad-Scope Analysis

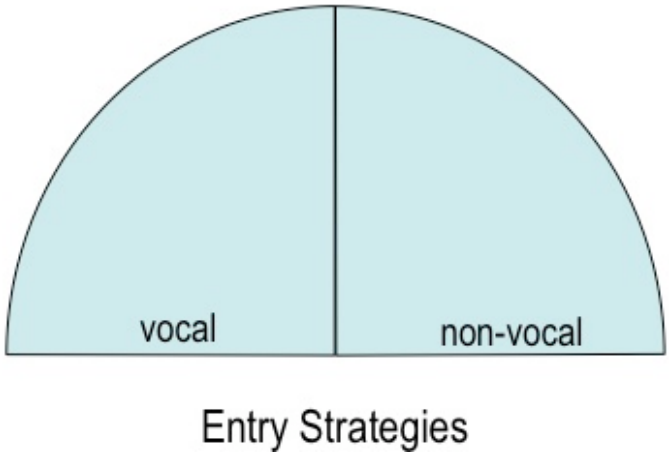
Retrospection about my study led me to organize my findings according to two major phases of my data analysis. Here in Chapter Four I describe the findings that emerged from broad-scope analysis. This phase was a complete review of the total corpus of the data through which I discovered categories for coding cases. In Chapter Five I describe case-level findings that emerged from the process of applying my coding scheme to three selected cases. The distinctions between these two phases were not as clear in real time as they appear on paper. Rather, the late stages of broad-scope analysis overlapped the early stages of more focused analysis as early trials at coding the data helped me return to, and refine my initial codes.

Although it is difficult to identify exactly when it was complete, I can report that broad-scope data analysis began immediately after data collection had concluded. The methods I employed in this phase of analysis included an initial review of footage, my creation of expanded field notes, transcription of CSCA group discourse, and early attempts at coding. In this chapter I describe what I learned about how participants interacted with one another during CSCA.

Broad-scope analysis revealed that students used a variety of strategies for engaging with their assignment document. These various strategies allowed students to manage entry into their assignment in myriad ways such as allocating control of, negotiating access to, and influencing the content of their assignment. Therefore I termed them *entry strategies*. The first conceptual diagram of these entry strategies showed that participants mainly used strategies that involved things that they said with their mouths, and things that they did with their bodies. I concluded that entry strategies fell into two

broad categories: Vocal and Non-vocal. I chose these titles for the categories of entry strategies purposefully and after careful consideration. Terms such as "Verbal" and "Nonverbal" might suggest that the communicative movements of the participant's bodies were unrelated to the communicative utterances they created with their voices. However, pertinent literature suggests that the production of speech, and the meanings speakers and listeners attach to that speech is inextricably tied to their fully embodied communication strategies such as eye gaze, physical orientation and proximity to others or objects, and especially to their gestures (McNeill, 1992; Driskill & Radtke 2003). To use the terms "Verbal" and "Physical" might also overlook the absolute physicality of speech production. The terms "Vocal" and "Non-vocal" convey that spoken and embodied communication are intricately related and that they are both physical and intellectual endeavors. However, using two separate and dichotomous terms also indicates that these two types of communicative strategies are unique parts unto one whole, with characteristics that distinguish one from another. Figure 4.1 represents my earliest understanding of the relationship between students vocal and non-vocal entry strategies.

Figure 4.1Vocal and Non-vocal Entry Strategies.



Some might argue that the following listing and description of vocal and non-vocal subcategories is better suited to the methodology section of this paper. Consider that Frederick Erickson reminds us how,

> Qualitative research is concerned with the identification of qualities (from qualitas)—the kinds of entities that exist in a particular local social world or 'local community of practice'…. The enterprise of quantitas first asks, 'What amounts?' whereas that of qualitas first asks, 'What kinds?' (Erickson, 2004, p. 487).

The following subcategories of vocal and non-vocal communication strategies and their descriptions were not obvious to me at the outset of the project. Rather, I discovered the kinds of strategies that students used in these CSCA experiences through the process of viewing, transcribing, reviewing, conceptualizing and considering the ways students communicated with one another and shaped the creation of their assignment. Therefore, I consider this listing of vocal and non-vocal subcategories (used in coding case level Studiocode timelines) to be an integral part of the *findings* uncovered in the broad-scale phase of data analysis. Specific definitions and examples of each of the vocal and non-vocal subcategories are delineated in subsequent pages.

VOCAL ENTRY STRATEGIES

Participants negotiated control of and access to the laptop computers that contained their assignment through vocal entry strategies. Vocal strategies were produced or carried out by portions of the group members' physical being directly involved in the production of speech and sounds emanating from the mouth (including, but not limited to the oral and nasal cavities, lips, tongues, teeth, throats and vocal chords). Many factors informed my decisions regarding how to code instances of vocal

entry strategies. I evaluated the syntax and content of the instance, the turn at talk it occupied, the length of time involved in the instance, the speakers' intonations while speaking and other contextual or non-vocal clues. Whenever possible, I tried to refrain from surmising the intent of the utterance, but did consider the consequences following certain types of utterances. The final coding scheme involved twelve subcategories of vocal entry strategies. In subsequent discussion I will refer to these twelve types of vocal entry strategies in one of two ways, calling them either 1) utterances or 2) vocalizations. Table _ shows the different types of utterances and vocalizations that participants used as vocal entry strategies. I defined utterances as turns at talk comprised of full words and sentences or longer combinations thereof. Vocalizations, in contrast, I defined as turns at talk or communicative acts comprised of short noises, single words or sentence fragments. Table 4.1 shows the twelve vocal entry strategies. Examples of these strategies excerpted from transcripts are detailed in the text that follows.

Table 4.1 Utterances and Vocalizations

Types of Utterances	Types of Vocalizations
Declaration	Affirmation
Question	Laughter
Summarization	Punctuation
Recitation	Consideration
Quotation	Exclamation
Contention	Other Vocalization

Types of utterances

Declaration

Declarations occurred when the speaker generated a statement or an utterance that did not include question words and/or phrases (see the listing in the description of questions), and the sentence or sentence fragment terminated in a falling intonation, glottal stop or neutral intonation.

Renea: Oh we were talking about what to add to the slide of what we don't know. (Transcript, 9/27/2006)

Laney: [Well I ha:ve] the characteristics of mentoring programs which is getting quite long. (Transcript, 11/15/2006)

Will: They're very close. It's cyclical perhaps. Yeah. It would be like uh learning to take apart a motor or an engine from a book versus hands on. You know you get that actual experiential knowledge. (Transcript, 9/13/2007)

Question

I coded instances of vocal engagement strategies as questions when the content of the utterance involved question words such as who, where, why, when, or how. I also coded utterances with content including phrases such as, "did you", "do you", "was it", "are you" or "can I" as questions. Furthermore, I coded instances as questions when the speaker terminated the utterance with a rising intonation- particularly if this intonation was found in combination with the content cues listed above.

Max: You don't have that, you don't have the Summers article do you? (Transcript, 9/27/2006)

Laney: So fear of asking questions is is characteristics of potential mentees? (Transcript, 11/15/2006)

Jessica: Is that/ are you talking about behaviorism? Is that the attaching a stimulus kind of thing? (Transcript, 9/13/2006)

Summarization

In terms of pitch and meter, instances of summarization were practically indistinguishable from declarations. The main difference between these two categories was the content of the utterances. Summarizations occurred when CSCA group

participant's reported the methodology or findings of articles they had read, reviewed and posted in their online discussion forums. The greater length of time involved in the turns at talk coded as instances of summarization also distinguished this category from others.

> Shannon: Yeah and when I was reading this paper um at first um, the author, the uh the authors we just mentioned all the learning models were not good, not a good {?} and so we would, we propose an alternative model which is an affective model. But then, they just did the the survey based on the two models like motivation and affective so…. (Transcript, 9/13/2006)
>
> Dr. Ossem: [We looked at] we were talking about different structured groups and how we have more structure vs. informal groups and that made a difference in terms of […] (Transcript, 9/27/2006)
>
> Ellyn: That's one of the, one of the articles I found and it was more about bad teachers than about mentoring, but it was saying that new teachers who went to professional development, like had mentors, they got better. But you had no idea if that was because they were kind of like, self-starters who would pursue that kind of program. (Transcript, 11/15/2006)

Recitation

Recitation occurred when the speaker read aloud written text that was part of the assignment document. A combination of the content of the utterance, the speaker's embodied behavior while speaking, and that the speaker appeared to be referencing the assignment document all contributed to a decision to code a recitation. The content of the utterance was either an exact or extremely close match to the text of the assignment document from which the speaker appeared to be reciting. Non-vocal cues usually included facing and gazing at the document from which the speaker was reciting. Sometimes the act of pointing to or typing into the document was visible as well.

Content cues occasionally included a verbal reference to the assignment document such as, "we have", or "it says", etc. Frequently, the speaker's tone and rhythm indicated a change from spontaneously generated talk to a recitation of written material.

> Will: ((Speaks slowly and in a lower tone as he types)) Different effects of different affects. (Transcript, 9/13/2006)
>
> Marcella: It says, “online communities exist via the connectedness and interactions that take place”. (Transcript, 9/27/2006)

Quotation

Several times a speaker read from source materials such as electronic or hard copies of articles used in the creation of the assignment document. In these instances I coded the turn at talk as a Quotation. I consulted the source documents (all but one were available), to confirm that the participant was quoting from that text. Many of the tonal and rhythmic cues that indicated quotation had occurred were similar to those that indicated recitation had occurred. Changes in the speaker’s tone, rhythm, or speed of speech indicated a shift from spontaneously generated talk to a quotation of another author's written material. Speakers also gazed at, or pointed to the source document from which the quotation came. Finally, the content of utterances coded as quotations often included a direct reference to the source material or a phrase such as, "they said", "it says", etc.

> Will: …a t-test analysis showed the students of the CBI outperformed those in the control…. (Transcript, 9/13/2006)
>
> Stuart: ((Reads from the screen in a quiet tone.)) …the first three items of the …scale… (Transcript, 9/13/2006)

Types of vocalizations

Affirmation

Affirmations occurred when speakers uttered short (often positive) words, phrases or sounds such as "yes", "yeah", "uh-huh", "mm-hm", "right" or brief combinations of these words, phrases, or sounds. Often these were uttered during another speaker's turn at talk or immediately following another speaker's turn at talk. I also coded affirmation when a group member overlapped another speaker's utterance by directly repeating the (sometimes full, but most often partial), content of their talk.

Renea: Yeah. (Transcript, 9/13/2006)

Will: Mhm. (Transcript, 9/13/2006)

Stuart: Yeah student to student. (Transcript, 9/27/2006)

Laughter

Laughter was indicated in the timeline when one or more group members appeared to be laughing. If more than one group member was laughing simultaneously then I coded one instance of laughter, but that instance was marked with the multiple names of all participants who engaged in the laughter.

Contention

Contention occurred when an assertion was made in contrast to or against another participant's statement or utterance, or when a question was answered negatively. Unqualified contention was rare, brief and congenial. Disagreement was often qualified by an utterance that constituted some form of agreement coupled with the contention. In fact, most occasions in which one participant disagreed with another group member were not coded as contention because they were not framed as an argument or statement against the other participant's ideas, etc. Differences of opinion were linked with an

initial affirmation. They were framed in a way that minimized the appearance of disagreement. (Thus, I marked these instances as an affirmation directly followed by a declaration. I marked both the affirmation and the declaration with a guarding outcome- this will be explained in detail later in this chapter.) The inclusion of the word "no" helped distinguish Contention from the "guarding affirmation+guarding declaration" form of disagreement.

Stuart: The Grasha One?

Renea: No no no no no. (Transcript, 9/27/2006)

Marcella: Is it a distance one?

Laney: Um, no I think it wa:s…. (Transcript, 9/13/2006)

Punctuation

Punctuation occurred when participants made vocalizations just before the beginning of, or just after the end of a series of turns at talk that shared related content. Much like a period, comma or parenthesis can, "separate sentences and their elements to clarify meaning," (Oxford American Dictionary) a punctuation vocalization helped indicate the boundaries of related sets of turns at talk. For example, punctuation vocalizations sometimes occurred between a group's off topic and on-topic conversations. Content of punctuations often included short words or vocalizations such as "ok", "so" or "uhm". Usually the vowel sounds were extended during the delivery of the vocalization.

Marcella: U:m…. (Transcript, 9/13/2006)

Stuart: So um… (Transcript, 9/13/2006)

Exclamation

Exclamations were sudden vocalizations or brief remarks made in response to an immediately preceding turn at talk. One might argue that these could be coded as affirmations because the main consequence of the exclamation is primarily that the participant's receipt of the speaker's message is confirmed. However, there is an element of surprise or dismay communicated therein that does not occur in vocalizations that are merely affirmative. This element of surprise is communicated in a pattern of changes in pitch- rising, falling, rising again, and then falling slightly once more at the termination of the exclamation. These "hills and valleys" of pitch differ noticeably from the relatively flat tones in which affirmations were delivered.

Marcella: Seventynine! (Transcript, 9/13/2006)

Renea: O::h ok. (Transcript, 9/27/2006)

Consideration

Instances of consideration were issued in response to an interlocutor's utterance. They differed from most affirmations in that they were monosyllabic, and usually delivered in a tone cascading from a high pitch to a lower pitch. Their consequence appeared to the researcher to indicate that the content of the prior utterance had been of interest and had been, was currently, or would be thought about.

Shannon: Mmmm. ((Nods.)) (Transcript, 9/13/2006)

Marcella: Huh. (Transcript, 9/27/2006)

Other Vocalization

On a few occasions participants would make vocalizations that did not fall neatly into other coding categories. These vocalizations were not phrases or words, but instead could be better characterized as vocal noises or sounds. Due to their nature, examples were difficult to transcribe. In one instance the group member exhaled a loud and audible

breath, in another a participant sounded a short laugh/scoff. Figure 4.2 indicates that subcategories for vocal entry strategies emerged during broad-scope data analysis.

Figure 4.2 Vocal Entry Strategies

CATEGORIES OF NON-VOCAL ENGAGEMENT STRATEGIES

CSCA group participants also negotiated control of and access to the laptop computers that contained their assignment through non-vocal entry strategies. Non-vocal strategies were produced or carried out by portions of the group members' physical being not directly involved in the production of speech or sounds emanating from the mouth (including, but not limited to their legs, torsos, hands, fingers, heads and eyes). In determining physical engagement strategies, I attended to the participants' physical placement in the group work space, the movements of their bodies and body parts in relation to the prior positioning of those bodies and body parts, their movements and positions relative to other group members, and most importantly, their positioning and movement relative to the notebook computer that contained the assignment document. Participants displayed a broad array of postures and physical behaviors in relation to one

another, in relation to their surrounding environment and all the objects therein. However, I had to narrow the scope of the data points in order to focus on the group members' interaction with the instructional technologies used in the CSCA authoring task. I accomplished this by coding non-vocal behaviors that were directly tied to or directed at the computer that contained the assignment document. Broad-scope findings include seven subcategories of non-vocal strategies for managing entry into the assignment document. These seven non-vocal engagement strategies are described here with examples of each excerpted from Studiocode timelines.

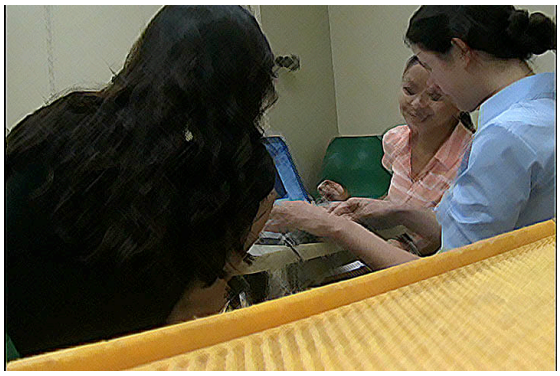
Facing

Figure 4.3 Facing

Facing occurred when participants aligned their bodies or parts of their bodies, (the front of their torsos and/or shoulders and/or necks and/or faces), to become approximately parallel to the assignment document. Sometimes this movement consisted of a rotation or realignment of the body or parts of the body to establish this alignment with the assignment document. Facing also occurred when the typist placed the laptop in relation to another participant so that their bodies or parts of their bodies would become approximately parallel to the assignment document.

Leaning

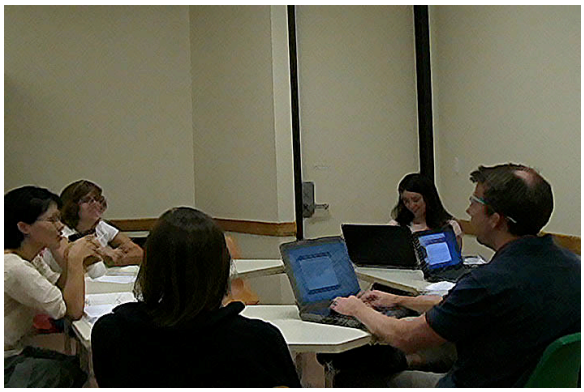
Figure 4.4 Leaning



Leaning occurred when participants moved their bodies or body parts (torsos, shoulders, necks or faces) to position themselves closer to the assignment document than they were in the prior physical position. When the movement from the participants' prior position began, coding began. The instance continued until the participant had returned to their original position or a close approximation thereof. Often this movement consisted of a shift away from the midline of the initial posture: either forward or backward, or to the left or right. Leaning and facing are not one in the same, but they were related and usually occurred simultaneously. Leaning often facilitated facing.

Touching

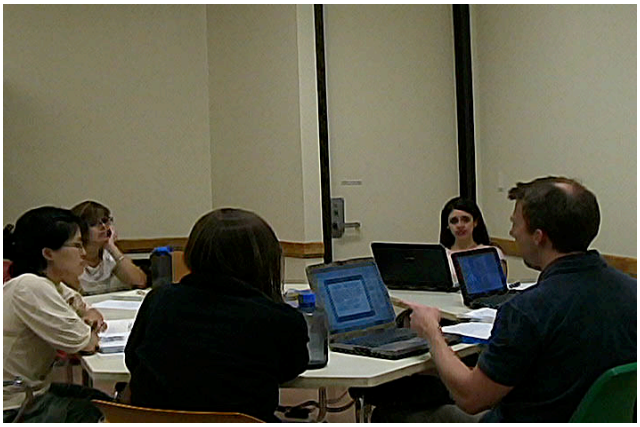
Figure 4.5 Touching



Touching occurred when a CSCA group participant placed a portion of their physical being on the notebook computer that contained the assignment document. When the participant made contact with any surface or portion of the notebook computer that contained the assignment document coding began. Coding proceeded until the corporeal contact with the computer was discontinued.

Pointing

Figure 4.6 Pointing



Pointing occurred when a CSCA group member extended one or more fingers toward the screen where the assignment document was displayed. Pointing also occurred when a group member extended an implement (such as a pen) toward the screen where the assignment document was displayed. The finger(s) and/or implement(s) were positioned so as to create and "intrinsic spatial connection" or "directional vector" (Clark, 2003) that extends from the finger(s) or implement(s) to the laptop screen. Coding began when the participant began to move their hands, fingers or implements so as to create said "directional vector". I discontinued coding the instance when movement away from the pointing position commenced.

Placing

Figure 4.7 Placing

According to Clark (2003) "In placing, speakers try to *place* the object they are indicating so that it falls within the addressees focus of attention." [Italics in original.] Placing occurred in CSCA when a group member moved the laptop from its previous position. Most often this occurred in order to allow other CSCA group members to see the screen.

Reorienting

Figure 4.8 Reorienting

Reorienting occurred when one or more group members rose up out of their chairs and changed their position in the group workspace relative to the notebook computer that contained the assignment document.

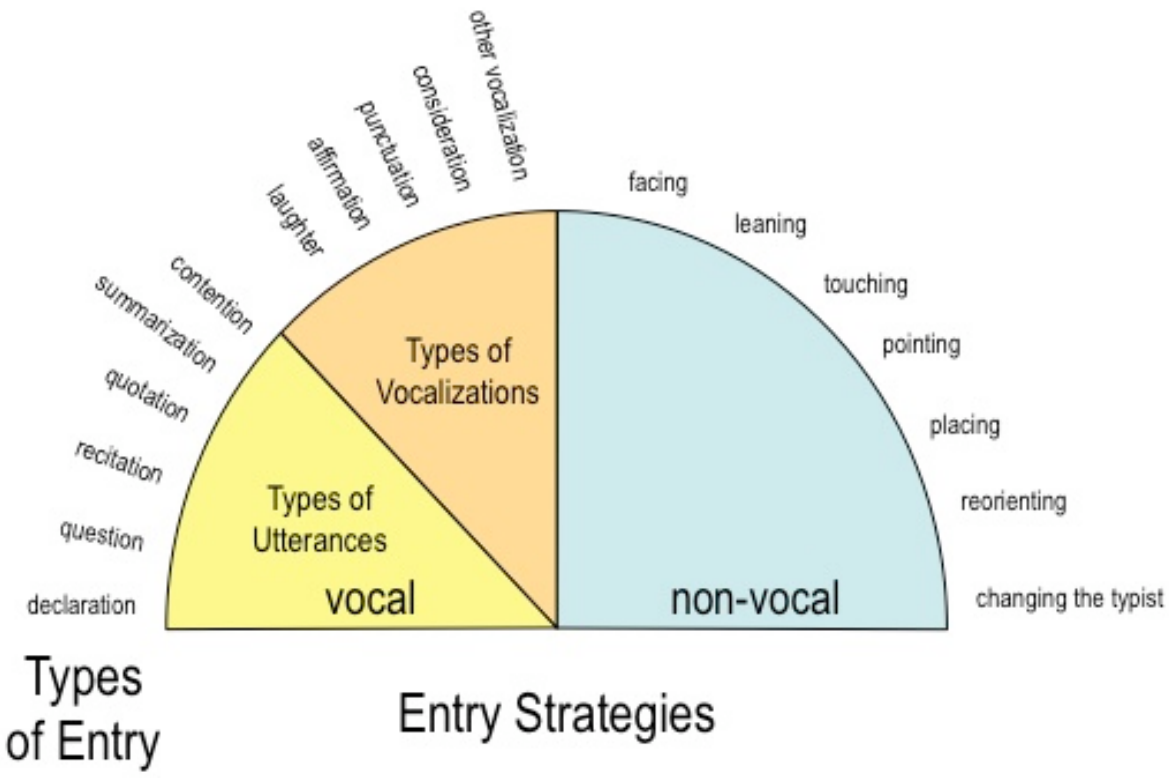
Changing the typist

Figure 4.9 Changing the Typist

Changing the typist occurred when a CSCA group member who was not the first person to type text into the assignment document assumed that task. Most often this was accomplished by a reorientation of the physical position of the group members relative to the laptop that contained the assignment document. However, on at least one occasion the Change in Typist occurred when the computer that contained the assignment document "crashed" and another computer was used to create the assignment document without a physical reorientation of the group members.

Broad-scope analysis revealed that students used an array of vocal and non-vocal strategies for managing entry into their assignment documents as they engaged in computer supported collaborative authoring. Figure 4.10 shows the subcategories of non-vocal entry strategies added to the model.

Figure 4.10 Subcategories of Entry Strategies



OUTCOMES OF VOCAL AND NON-VOCAL ENTRY STRATEGIES

Early in the process of broad-scope data analysis I identified the kinds of strategies participants used for negotiating access to and control of the laptops used in CSCA. As the scope of analysis gradually narrowed I worked to create the first transcripts of some of the computer supported collaborative authoring sessions. This endeavor required that I view and review more specific footage of classroom interactions. It was helpful to compare what I heard in the face-to-face discussions with what students had posted in online discussion forums. I also cross-checked the content of the emerging transcripts with the assignment documents they posted at the end of their face-to-face authoring sessions.

During this extended consideration of the CSCA data I discovered occasions where group members sanctioned contributions of others, or saw their own ideas added to the assignment document. These observations made me aware that speaker's entry strategies had practical consequences, or outcomes with regard to the final content of the assignment document. Not all vocal strategies resulted in some sort of consequence for the assignment. But sometimes a student might make a comment about a research article they posted and it would be quickly added to one of the pages of the document. On other occasions participants would talk at length about a personal experience. Although their anecdote was an audible part of the group discussion, it was not reflected in the text of the group summary assignment. In one early journal entry (10/31/2007), I logged an observation about one typist who seemed to function as a "gatekeeper" of the thoughts going into the assignment document. It was not completely clear to me prior to this point that group members not only accepted, but also deflected the contributions of others.

I became more able to see links between the content of the students' discourse and their summary assignment documents. I regarded these connections between face-to-face communication and textual content of the assignment as evidence of the outcomes of the various entry strategies. This evidence made it possible to determine which ideas and contributions were included in the text of the assignment that was posted at the end of the collaborative authoring hour. Comparisons of the coded timelines, transcripts, and assignment documents revealed that there were three main outcomes of participants' entry strategies- gaining outcomes, granting outcomes, and guarding outcomes. In other words, CSCA groups negotiated access to and allocated control over their assignments by 1) Gaining, 2) Granting, or 3) Guarding their own or other members' entry into the assignment document.

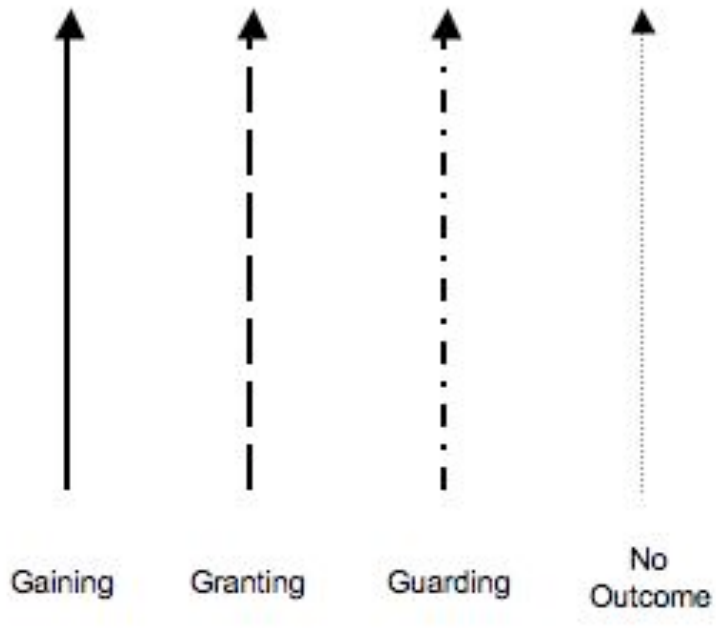
What were the main characteristics and differences of the three gaining, granting or guarding outcomes? Gaining and granting outcomes resulted when ideas or suggestions did make their way into the summary assignments. Gaining outcomes resulted when the entry strategies of a CSCA group member accomplished their own entry into the assignment. For example, one student gained entry into the assignment with the following question "Well first of all, d'you want me to keep track of like how to build the power point slides…" (Transcript, 9/13/2006). Granting outcomes resulted when the entry strategies of one CSCA group member facilitated another group member's entry into the assignment document. One participant even granted the professor entry into the assignment by asking "Would you like to speak to that?" (Transcript, 9/13/2006).

Guarding outcomes resulted when ideas or suggestions were not added at all, or were not added in the way they were originally proposed. Therefore, guarding occurred when a CSCA group member prevented either their own ideas, or another group member's ideas from being entered into the assignment. Guarding outcomes also resulted when entry into the assignment was somehow modified. For example, a guarding outcome resulted if one group member suggested that an idea be included in the "what we know" section of the assignment document, only to see that idea placed on the "what we *don't* know" slide instead.

Many times students would make contributions to discourse that were not included in the content of the final assignment document. There would be no way to efficiently record every contribution to an hour of talk in text. Therefore, many vocalizations and utterances had no outcome in terms of the assignment's content. In my model I added the gaining, granting, guarding and no outcome markers as arrows that

would correspond to the various consequences of participant's contributions. These are shown in Figure 4.11 below.

Figure 4.11 Gaining, Granting, Guarding



When coupled with each contribution made during CSCA, these arrows could indicate if and how an entry strategy moved from the conversation into the assignment document. Consider the following exchange:

> Renea: … classroom community that that's possible without the learning community. That's something we know or we jus/
>
> Stuart: na that's sort of hyp, hypothetical actually
>
> Renea: Jus' say we know it.
>
> Group: [laughter]
>
> Marcella: [Are you sure?] I think she wants research.
>
> Group: laughter

Max: We'd really like to know it.

Group: laughter

Renea: Oh I really think so.

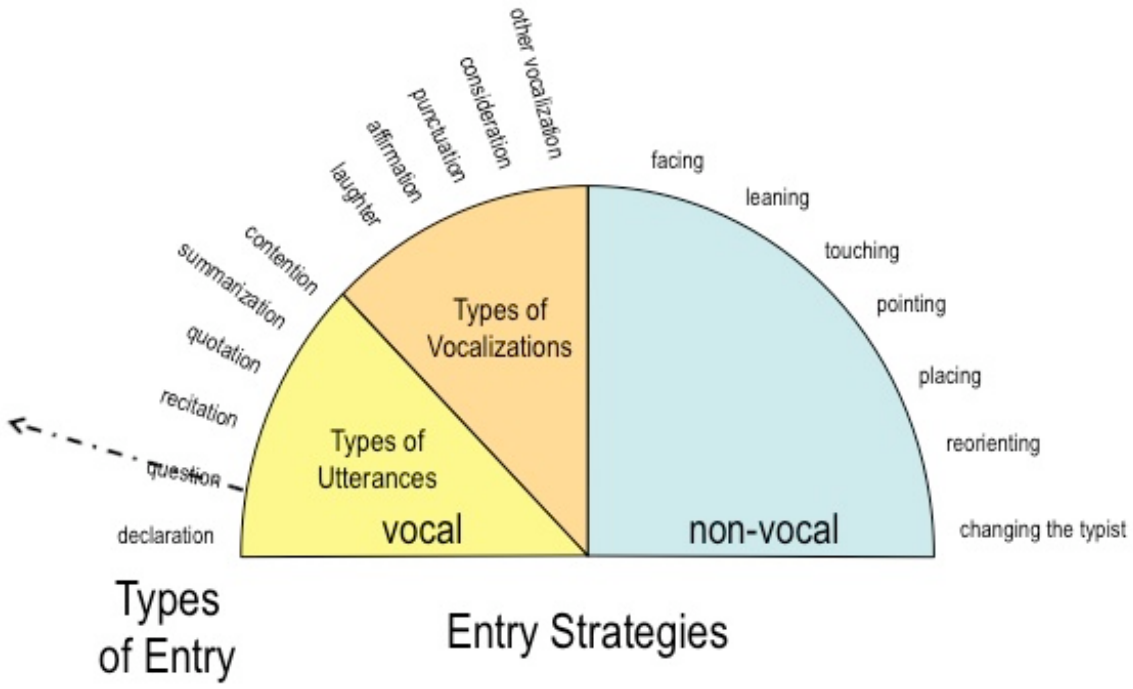
Marcella: I agree, but she wants research (Transcript, 9/27/2006).

The group was discussing whether or not it was possible to have a classroom community without first establishing a learning community. Renea was eager to add this information to the slide detailing what the group knows about the topic of Community. She suggested adding this idea in the "what we know" portion of the assignment even though the group would not be able to provide a citation for the claim. In spite of the laughter resulting from the comment, Marcella guards against Renea's suggestion with a question and a declaration in line 178.

Renea makes another attempt to get the idea added to the list of what they know in line 182. Again in line 183, Marcella guards against Renea's bid for entry into the assignment using an affirmation coupled with a reiteration of the Professor's desire to have knowledge claims supported by research. Marcella did add the classroom community vs. learning community issue to the assignment document. However, instead of placing it on the "What We Do Know" slide, she entered it on the final slide entitled "What we don't know/Hypothesis". I marked her vocal strategies in lines 178 and 183 with guarding outcomes because Marcella did not enter the ideas into the document in the way in which Renea had advocated for their inclusion.

My emerging model could represent each coded instance in the timeline with an arrow that indicated whether or not a particular CSCA entry strategy resulted in a consequence for the content of the assignment document. I mapped Marcella's guarding question from line 178 in my model. The resulting illustration is represented in Figure 4.12.

Figure 4.12 Line 178 Mapped in the Model



The exchange between Marcella and Renea also served as an example of a common method employed for disagreeing with a collaborative co-author. As I mentioned previously in the section on vocal entry strategies, outright contention with the contribution of another was rare. Line 183 in the exchange above is representative of a common tactic that students used to voice an opposing view or opinion. They issued an affirmation attached to what I call an "utterance in contrast".

Studiocode allowed me to create a variety of custom-made markers for the coded instances. By marking coded instances in the timeline I was able to indicate, where applicable, that a gaining, granting, or guarding outcome was attached to the instance. When I encountered utterances in contrast like the ones shown above, I first coded the affirmation and the declaration as two separate instances. Then I marked both the affirmation and the declaration with a Guarding outcome. Figure _ shows the preceding portion of the community group's discussion as it is represented in the Studiocode

timeline. Where applicable, the coded instances were marked with the corresponding outcomes. I chose to code and mark the affirmation and the declaration separately so that tabulations performed by the software would reveal that affirmations were associated with guarding outcomes. In other words, affirmations were not always associated with purely supportive statements.

I was becoming more adept at coding and marking the timeline of the community group's discussion. Working that way required repeated viewing of the footage of various CSCA groups. My journal revealed that I was grappling with new aspects of my original research question about how students negotiated access to their assignment. I had noticed that students were not simply accessing the document they were working on. They were creating it, changing it, and shaping it together. In a word they were influencing their assignment.

SUMMARY OF BROAD-SCOPE ANALYSIS

Broad-scope analysis revealed the kinds of vocal and non-vocal strategies that students used as they discussed and synthesized, then translated their understanding of pertinent research into their assignment document. Vocal strategies were produced or carried out by parts of the body directly involved in the production of speech and sounds emanating from the mouth. Some turns at talk were comprised of full words and sentences or longer combinations thereof. I referred to these as utterances. Vocal strategies that were categorized as utterances included: declarations, questions, summarizations, quotations and recitations.

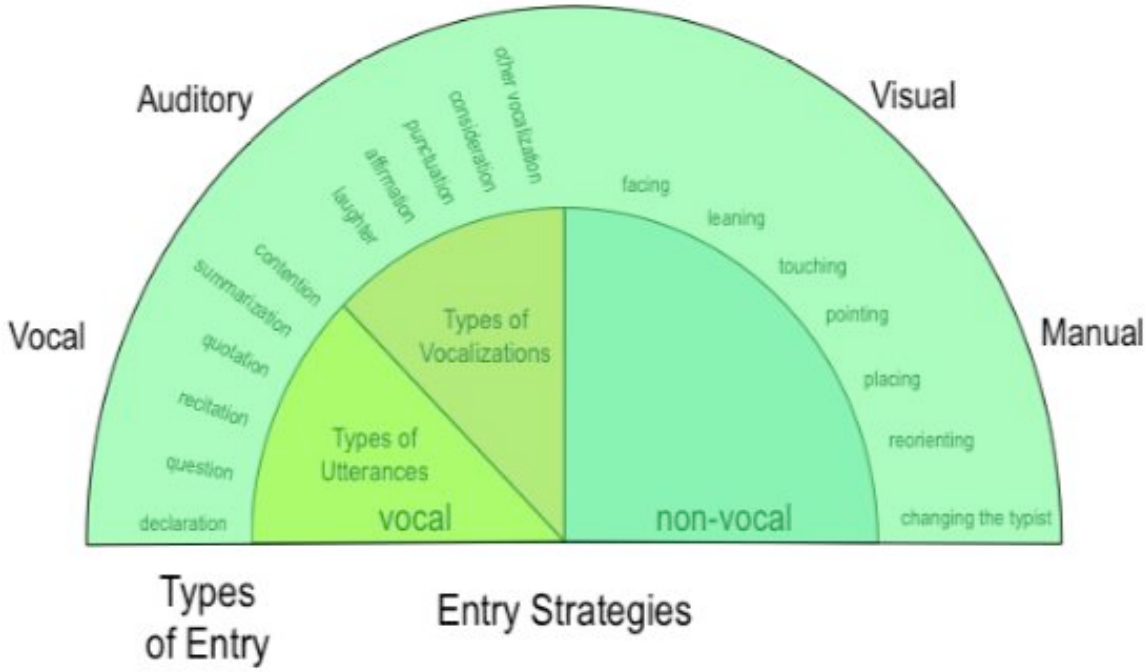
Other turns at talk were comprised of short noises, single words or sentence fragments. I referred to these vocal strategies as vocalizations. Examples included affirmation, contention, exclamation, consideration, laughter and other vocalizations. Non-vocal strategies were produced or carried out by parts of the body not directly

involved in the production of speech and sounds emanating from the mouth. Non-vocal strategies included leaning, facing, touching, pointing, placing, reorienting and changing the typist. These kinds of vocal and non-vocal entry strategies constituted the final coding scheme used in case-level analysis.

I began to notice that there were connections between the different components of my data set- the online discussion forum, the footage of face-to-face communication and the written summary assignment documents. These connections revealed that they entry strategies students in the process of communicating about their assignments were associated with three main outcomes: gaining entry into the document, granting entry into the document, and guarding the entry into the document. Gaining, granting and guarding markers indicated which vocal and non-vocal entry strategies had consequences regarding the final content of the assignment document. I had begun to engage in more focused viewing and analysis of the CSCA groups. I was watching footage over and again, coding vocal and non-vocal instances and marking them with outcomes where applicable.

My understanding of the nature of discourse in CSCA was also growing more complex with repeated exposure to more and more specific data analysis. This iteration of the model represents the kinds of entry strategies students used during CSCA. Different arrows showed how contributions did or did not gain, grant or guard student influence over the final document. I also began to understand that different kinds of entry strategies resulted in different types of entry into the document. Students had vocal, visual, auditory or manual types of entry into the assignment. Vocal entry strategies lent themselves to vocal and auditory entry to the document. Non-vocal strategies were more likely to result in visual or manual access to the assignment. These types of entry are included in the model in Figure 4.13.

Figure 4.13 Types of Entry



CHAPTER FIVE

Findings From Case Level Analysis

In this chapter I detail three cases of computer supported collaborative authoring groups. Each case represents one group that met online for one week and then onsite for one hour of CSCA during class. The description of each case includes 1) information about contributions to the online discussion forum, 2) a description of the opening minutes of the class including any large group discussion preceding or leading up to small group work, 3) a narrative of the CSCA hour and 4) additional data analysis and observations about the case.

I considered several aspects of students' contributions to the online discussion forum. First I report information about how many messages each participant posted. The number of messages was one indicator of each participant's presence during the week they met online. I also report how many characters and how many words each post contained. These frequency counts indicated the length and density of the posted messages. They show whether or not a participant contributed long or short posts comprised of large or small words. I note which participants attached electronic articles relating to their topic of discussion. The attachments first reveal that the participant invested time in performing a literature search. Secondly, posts that were associated with an attachment included the students' own reflections or comments accompanying a synopsis of the article's findings and implications. Messages that included this kind of content showed that the student had already engaged with the topic thoughtfully.

CSCA groups did not form or carry out their collaborative task in a contextual vacuum. Therefore, I include a description of the opening minutes of class time.

Portrayals of discussion preceding small group work convey that CSCA interactions were embedded within larger contexts. Several times I traced the source of a group norm or expectation to the opening discussion. For example, the large group discussions were often occasions for the professor to scaffold group work. Not only the instructor, but also the students shaped CSCA during whole group discourse when they clarified instructions, expectations and topics for upcoming work. Pinpointing sources of student's understanding of their assignment illuminated subsequent analysis.

Connecting large group preambles to small group CSCA also revealed the procedural flow of classroom activities. Students moved about in and often changed the structure of their classroom environment to facilitate small group work around computers. Socio-contextual transitions were often made under practical constraints--such as the location of power sources. Seemingly mundane details of the classroom environment thus had legitimate consequences for the structure and function of CSCA groups. Preludes to CSCA are described to further illustrate the rich setting in which small group interactions occurred.

A narrative of the CSCA hour enfolds analysis within a chronological account of the groups' discussion and authoring process. Additional analysis and observations follow. There I relate information about the types of strategies students used in CSCA. I note the frequency, duration and distribution of these strategies amongst participants over the authoring hour. Answers to my research questions emerged from this data as my theoretical model of CSCA discourse grew. In all case summaries and analyses last names have been excluded for the purpose of maintaining participant confidentiality and pseudonyms are substituted for the author's first name.

CASE ONE: THE IMMEDIACY GROUP

The first case group participated in face-to-face CSCA on September 13, 2006. Marcella and Stuart had volunteered to be the topic leaders for that week. Annie, Ellyn, Laney, Marcella, Shannon and Stuart discussed the topic of teacher immediacy. Participants defined teacher immediacy as 1) the perceived amount of psychological distance between and instructor and their students and 2) the ability to work in the here and now. This was the third face-to-face meeting of the course, but it was the first time that small groups engaged in computer supported collaborative authoring. Therefore, accounts of the large group discussion on this date are particularly important. Therein the professor built pivotal scaffolds that structured both the authoring process and the authoring products that the students co-created. The narrative of the authoring hour allowed me to more fully explore and discuss examples of students gaining, granting, and guarding access to the assignment document.

Additional analysis showed one of the most interesting aspects of this case was their lack of physical interface with the assignment. By virtue of the seating arrangement, half of the students had no view of the assignment until it was already completed and posted. They had a markedly different engagement with the document than the students who could see as they composed. I began to understand that issues of access began with basic availability of the assignment. Entry into the assignment occurred on a continuum including availability, access and influence over the document.

I also discerned a large discrepancy between the onsite and online contributions of one particular group member who spoke English as a second language. Contrasting her contributions to the discussion forum with her contributions to face-to-face authoring prompted me to consider potential inequalities in computer supported collaborative authoring.

Contributions to the online discussion forum

Discussion forum postings related to the teacher immediacy group first appeared on Friday, September 8 (Stuart. Fri Sep 08 2006), and continued until Wednesday, September 13th (Ossem, M. Wed Sep 13 2006). A total of 26 messages were posted within four separate discussion threads. Table _ shows the contributions that face-to-face to this online discussion. Early in the semester, students posted to several discussion threads. Therefore, the table below shows that topic leaders were active in more conversation threads than other students. Posting to several different discussion threads proved to be confusing to many students. They agreed during large group discussion that in the future they should each enfold all posted messages related to one topic into one discussion thread. Posting to several different threads created difficulties during data analysis as well. I could not locate Shannon's contributions to the online discussion about teacher immediacy.

Table 5.1 Contributions to the Immediacy Group's Online Discussion.

Participant	Total Posts	Total Threads	Attachments	Total Characters	Total Words
Stuart	8	4	2	6,336	1,228
Marcella	4	3	2	3,787	720
Annie	4	1	-	3,776	661
Ellyn	1	1	1	2,995	525
Laney	3	1	1	815	171
Dr. Ossem	6				

Opening discussion with the whole class

All of the following images, descriptions and quotations were excerpted from video recordings captured on September 13th, 2006.

Figure 5.1 Whole Class Discussion 9/13/2006

Figure 5.1 shows how members of the class had rearranged the modular tables out of parallel rows and into a large oval in the middle of the room. The professor spoke about expectations and procedures for successful and effective work online. Participants shared strategies and resources for locating scholarly research related to their topics. Then the class shifted into a discussion about what to do during computer supported collaborative authoring. First the two small groups clarified what their topic questions were. Then the professor described how they should summarize and synthesize research that addressed their respective topic questions. She informed the class that after approximately an hour, they would, "…come back and each group [would] report out what they found". Then she pointed to the paper agenda and said, "And I had those four questions on there….What do we know, how do we know it- that's the research question- uh, what don't we know, and how could we find out. And we'll just have, we'll come back to this format ((she traces an imaginary oval with her hands)) and we'll just talk about it."

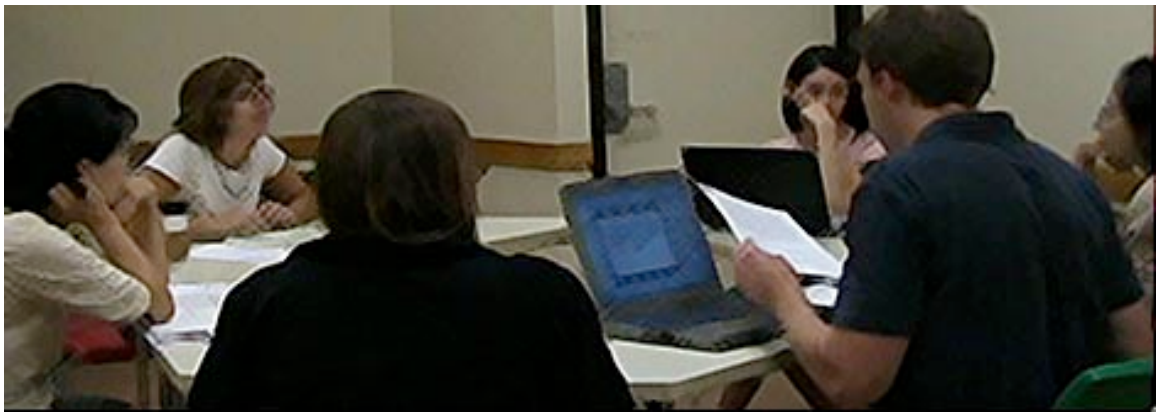
Dr. Ossem quickly offered an opportunity for students to clarify what they were expected to do. Marcella asked, "So should our group work be, you know, answering those four questions?" Dr. Ossem replied, "My main goal is for you to come up with a summary with the answer to that [topic] question…. But one of the things to look at would be, well what do we know about the cognitive things and what kind of research

supports that." Marcella asked, "So that's an ok way to organize?" Dr. Ossem confirmed, "Yes that's right you can organize it that way," then added that they could organize the assignment document in any way they wanted. The four questions, (What do we know? How do we know it? What don't we know? How could we find out?), that Dr. Ossem had referenced in that day's agenda immediately became and thereafter remained pivotal cognitive scaffolds for the students over the entire semester.

Computer supported collaborative authoring

Next Professor Ossem directed the reorganization of the classroom into two authoring groups clustered in close proximity to the electrical outlets. Students rose from their seats and moved to their respective areas of the room. Figure 5.2 shows the immediacy group's configuration during CSCA.

Figure 5.2 The Immediacy Group



As the group coalesced, Stuart and Ellyn began to clarify the relationship between two of the articles that were posted in the online forum. Group members commented on Stuart's copious contributions to the online discussion forum. Once all group members were seated with their personal learning materials prepared, the group determined how to begin their first CSCA endeavor.

Marcella: U:m… what if uh… I d'know. Any, any views on how to start?

Stuart: Well first of all, d'you want me to keep track of like how to build the poser point slides for organizing {?} things

Marcella: ((nods)) If y/ if you would like. Then what if we go around and say what we put up? What we posted.

Stuart gained his entry into the document quickly. Marcella also granted Stuart influence over the assignment when she agreed that he could create the power point document if he would like to do so. The role of typist was thereby established rapidly in approximately 8 seconds of dialogue between the two group leaders very early in the authoring process.

With these initial roles established, Laney began their authoring discussion by contributing a summarization of the article she found and posted. However, the rest of the group did not adopt Marcella's suggested strategy. Instead of working article to article, Ellyn offered a summative statement about trends across the research, "I would think that in general there were a number of articles that talked about group differences….in terms of how people perceived [immediacy]" (Transcript line 35). The group discussed in general terms how the perception of immediacy was dependent on many different factors. Then the students related personal experiences that led them to believe immediacy was not always a positive characteristic in faculty-student relationships.

Stuart recalled that Dr. Ossem had recommended an article investigating immediacy in an online environment. Marcella proffered that online immediacy constituted a third and separate type. Stuart guarded against Marcella's conceptualization, advocating instead for a model where online immediacy was a subtype

rather than a category unto itself. Marcella and Stuart negotiated whether there were two or three types of immediacy, each with distinct definitions.

Marcella: That's the third kind or second or third kind [of]

Shannon: [Right.]

Stuart: Wh'ts, what was the first two then again?

Marcella: Well the first kind is this one that pops up the most, the perceived amount of distance in the relationship.

Shannon: Mhm.

Marcella: Um, the second kind was the one that's not really researched much in the teaching field, but in counseling it's seen as the ability to work in the here and now, in the moment, ((a portion of her talk is drowned out by ambient talk)) you know as you notice the students aren't catch[ing on]… or are confused you can do something about the he[re and now]

Laney: [Oh yeah I remember that.]

Marcella: instead of after they failed the test. Um, and then there's the third kind which Dr. Ossem posted about perceived um, how did she put it? Perceived connectedness in an online relationship,

Stuart: Yeah, I think that I was thinking of that as the s/ the same definition of immediacy. Just in two different environments, one in the class environment and one in the online environment.

Marcella: They're very similar. Um the only subtle difference I noticed was that the online one might have more to do with that a person was present. Does that make sense?

Stuart: {?}

Marcella: She can articulate it better than I can, I'm tryin' to read the post, don't know were it is.

Stuart: Was it, she posted it on the {web}?

Marcella: She told us.

Stuart: Yeah that's what I thought. I was like, did I miss that post? 'Cause I was gonna post it.

Marcella: Right.

Stuart told of the technical difficulties that thwarted his attempts to post a summary of the online immediacy article. In lines 111 through 192 in the transcript Stuart vocally summarized the article. Then other students related anecdotes about online discussions. They shared ideas about how to define, assess and research immediacy in online environments. Finally in line 193 Stuart summarized and restated the dual-definition model of immediacy.

Stuart: So right now it s/ it seems like we've found two definitions of immediacy

Marcella: Mm.

Stuart: This perceived amount of distance in the relationship

Marcella: Right.

Stuart: which is both physical

Marcella: Mhm.

Stuart: and [psychological]

Shannon: [and psychological] yeah

Stuart: And then the ability to work here in the now which we've seen mostly in the counseling literature

Throughout this exchange, Stuart successfully guarded and gained entry into a significant portion of the document. His interpretation rather than Marcella's was

reflected in the third of seven slides in the final assignment document. This slide was entitled *Two Definitions of Immediacy*.

Participants determined that the *How Do We Know* slide should detail how immediacy was measured in available research. Together they humorously critiqued an experimental study that did not report the statistical analyses used. Reservations about the quality of the research prompted Marcella to invite Dr. Ossem to comment on the journal in question. Dr. Ossem influenced the content of the assignment document during her visit to the group discussion. First she confirmed that the journal was publishing research from a field that was "not really sophisticated" in their research (Transcript line 398). Dr. Ossem's assessment of the quality of the research they found was included on the sixth slide, entitled *How We Know*. The second bullet point of on the slide says, "Less sophisticated research; primarily occurring in Professional Journal" (Stuart. Wed Sep 13 2006). The professor also suggested tactics for constraining subsequent literature searches to exclude articles published in that particular journal. (Transcript lines 406, 408, 413) The first bullet point on the *How We Could Find Out* says, "More searches outside of Professional Journal and for studies looking at the more sophisticated causality relationships". Therefore, Dr. Ossem's comments on limiting searches for literature were also included in the final draft of the assignment. This visit the immediacy group was the first of several examples of how the professor shaped the assignments. It was not only the students, but also the professor that could change the content of the presentation document.

After the professor had moved on participants discussed mediating factors affecting teacher immediacy. Stuart alternately skimmed and quoted from an electronic source document for over three and a half minutes while the other students waited quietly, but shifted periodically in their seats. Afterward he recited what he was adding

to the assignment document in light of the information he gained from consulting the article. In fact, Stuart's main technique for sharing the content of the assignment with other group members was to recite what was being or already had been written. He used this entry strategy three more times in the final minutes of the CSCA hour.

When it was time to report how they could find out more about this topic, Laney and Marcella made the first suggestions for additions to that slide. Interestingly, both repeated the ideas that Dr. Ossem had suggested in her visit to the group (transcript lines 596, 596). Ambient classroom noises then suggested that the end of the authoring hour was approaching. Rather than negotiating the role of spokesperson amongst all participants, Stuart vocally adopted the responsibility himself. He also humorously established that other group members would share the responsibility for helping him with the presentation.

After adding the final thoughts proposed in the last stages of face-to-face discussion Stuart suggested a ten-minute break. The professor called for students to post their summary assignment documents in the online discussion forum. Stuart wondered aloud, "So what was our topic?" just as he typed text onto the title slide reciting "Teacher…Immediacy Behaviors." Stuart and Shannon reviewed and clarified some of their prior discussion points before he selected a template for the presentation and submitted the electronic copy.

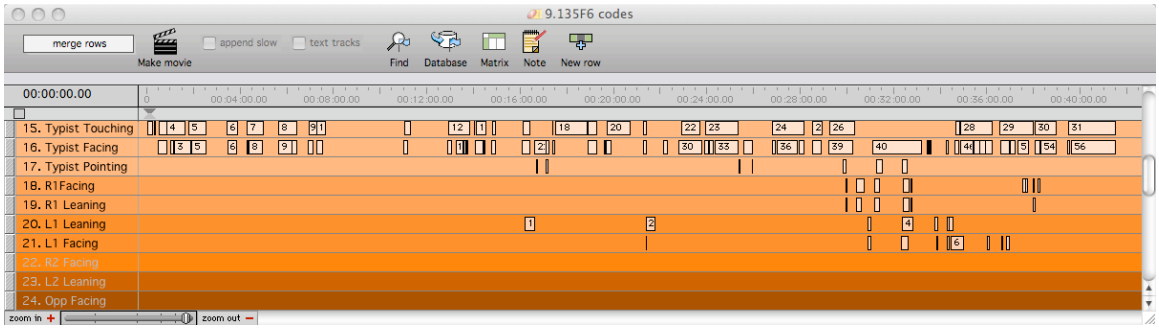
Additional analysis and observations

Non-vocal entry strategies

One of the most interesting findings in this particular case involved participants' lack of non-vocal entry into the summary assignment. The immediacy group engaged in only 125 instances of non-vocal entry strategies as compared to 232 and 253 total

instances of non-vocal entry strategies in the other coded cases. Only three of the seven total non-vocal categories were coded at all. Figure 5.3 below shows the coded instances of non-vocal strategies within the timeline for the immediacy group. Coding lines become progressively darker to show that students' distance from the laptop increased. The bottom three lines are completely devoid of coded instances because group members that were farthest away from the computer never engaged with the assignment document in non-vocal ways.

Figure 5.3 Non-vocal Codes: The Immediacy Group



Other than Stuart, Ellyn and Shannon were the only members who gained access to the document non-vocally. These sat in chairs directly to his left and right. Stuart could have granted other group members the ability to see the document by placing his computer in their sightline but he never did. Annie, Laney and Marcella could have gained access to the document through reorientation but did not. It was tempting to think that students had not yet explored all possibilities for interfacing with the document because this was the first authoring session. However, the small group did make use of all but one non-vocal access strategy that day, including reorientation of the group.

In fact the immediacy group used so few physical entry strategies that I reflected more deeply about the students' levels of access into their assignment. In my early trials at coding I had already discovered that students not only accessed, but also influenced their assignment. Now I was considering the authoring experience in light of students who never saw the final assignment document until it was complete.

It was likely that (for a sighted student) a lack of visual interaction with the document shaped the co-author's cognitive engagement with the assignment. All members were active to some degree in the process of authoring. Unfortunately some had no visual contact with their product until it was complete. On a few occasions Stuart recited what he had already written or what he was currently typing. Then the content of the assignment was at least available to all participants by auditory means. But granting access by purely vocal methods may have inadvertently created inequalities amongst group members- one member in particular for whom English was not a native tongue. In other words, the document was not available to some members in the way it was to the typist, or even to Ellyn and Shannon who were sitting in view of the assignment as it emerged and developed.

There were more than just two levels of entry into the document, more than just access and influence under negotiation. I conceptualized a continuum of entry into the assignment shown in Figure 5.4. As students moved from availability to integration they engaged ever more deeply with the content of the assignment document and the ideas it represented.

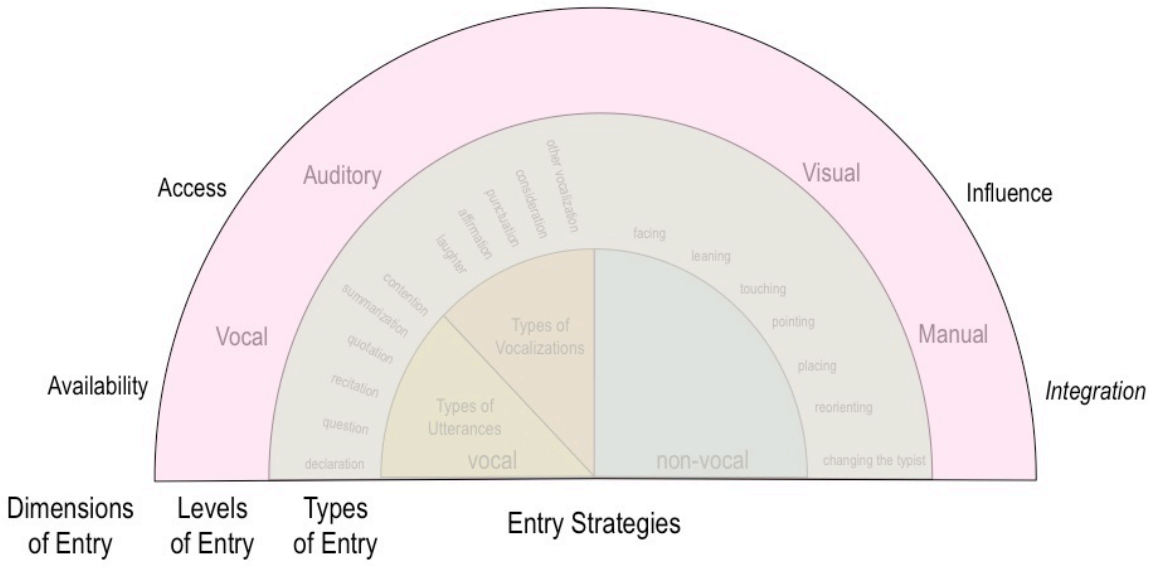
Figure 5.4 Continuum of Entry

Availability----------Access----------Influence----------*Integration*

Availability was the most basic level of entry. The assignment was present to the author in some way. Authors with availability could see or hear the content of the assignment. Access was the next step in the continuum. Authors could choose whether or not to attend to the discussion and assignment. Authors with access reflected on, discussed, or otherwise responded to the assignment cognitively or affectively. But to influence the assignment an author needed to change it, shape it or alter it somehow in a recordable and recognizable way. This was accomplished by interjecting an idea that was included in the text of the assignment, by suggesting that several ideas belonged under one heading, or even by rearranging the way a particular sentence was structured or worded. I saw examples and evidence of all of these levels of entry in both the broad-scope analysis and in the case level scrutiny of video footage, transcripts, and documents that represented the work of the CSCA groups.

I also hypothesized that a fourth level of entry could exist-- that of integration. (This term is italicized in the continuum in Figure 5.4 to indicate that integration is currently a theoretical category.) If an author had engaged with an assignment on the level of integration, then the content of that assignment would have changed the author. Perhaps their understanding of classroom community had changed enough that they would interact differently with the students in their next class. Maybe their encounter with research on mentoring programs prompted them to ask about the availability of faculty mentors when they were applying for academic positions. Or they were simply able to coherently relate their CSCA assignments to their own professional interests in their final project for the course. Figure 5.5 includes the levels of entry in the model.

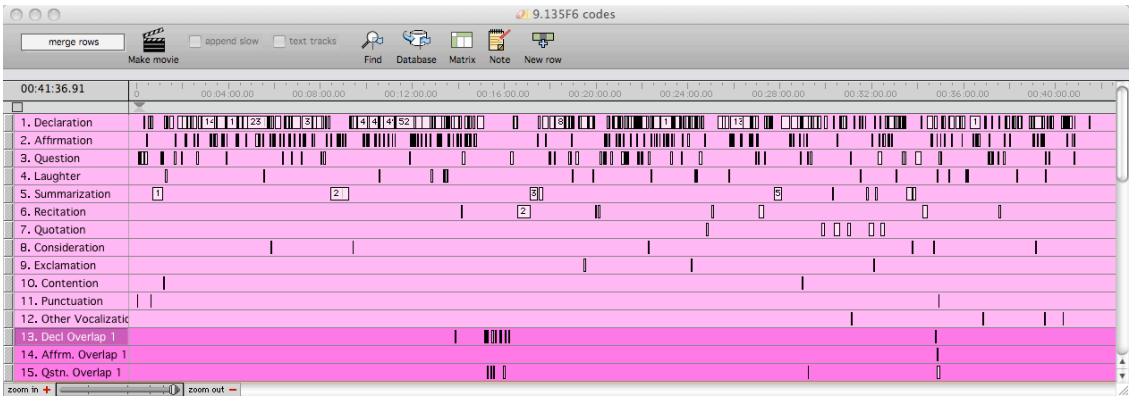
Figure 5.5 Levels of Entry



Vocal entry strategies

Figure 5.6 is an image of the vocal codes in the timeline for the immediacy group. The coded timeline shows the frequency of each of the vocal subcategories and well as their distribution across the authoring hour.

Figure 5.6 Vocal Codes: Immediacy Group



This group used the entire variety of vocal strategies for communicating with each other about the topic and assignment document. Note that the group engaged in two

short overlapping conversations. The first overlapping conversation occurred when the professor entered the classroom with an unusually large power strip. The group assisted her by relocating their laptop power cords in order to accommodate a need to supply a power cord to one of the video cameras. The second overlap was also quite brief and occurred in the later portions of the authoring hour. The typist engaged in two alternating turns at talk with Ellyn, presumably about the structure of a slide. It was interesting to note that as overlapping conversations emerged, they utilized progressively fewer kinds of vocal strategies. Overlapping discussions were not only brief, but also simpler in terms of the array of vocal strategies students used to communicate with one another.

Appendix A shows the number of instances coded for each vocal category, the total time and percentage time of the authoring hour taken up by the instances coded in each subcategory, and the mean time of the instances in each subcategory. It must be noted that every coded instance includes fractions of seconds just before and after the talk is begun and completed. Therefore, the reported time spent in producing talk in each subcategory is a close approximation.

Declarations were the most frequently used vocal subcategories. They accounted for the majority of the total time spent using vocal strategies for communication. Affirmations were the second most frequently coded vocal strategies. However, they accounted for far less of the total percentage of time students spent using vocal strategies. Although affirmations were frequent, they were brief, and did not take up a large amount of the authoring hour. The coded instances revealed that summarizations and quotations were far less frequent than declarations, affirmations and questions but had the longest mean times of the vocal strategies. Students apparently dedicated a longer portion of time to the task of vocally communicating the ideas and research involved in the studies they identified.

It was also important to consider a student's vocal contributions relative to the position of the computer where the assignment was composed. The typist made the most frequent vocal contributions during the authoring hour with 175 out of 514 total vocal instances coded. Stuart also contributed instances of vocal utterances from every coding subcategory. He contributed more declarations, questions, summarizations, recitations, quotations, considerations, exclamations, contentions, and other vocalizations than any other member. Furthermore, he was the only member to issue recitations. Recitation was his primary tactic for sharing information about the assignment with other group members. Stuart was also the only member of the group to read aloud word-for-word from a source document during the authoring process.

Marcella sat two positions to the right of the typist and served as co-leader for the discussion topic. Marcella did not have visual access to the notebook screen or the assignment. Nonetheless, she was second only to Stuart in terms of the frequency of vocal contributions with 113 instances coded. She contributed these vocal instances in six out of the 11 categories. Marcella contributed substantially to the declarations made and questions asked during the authoring hour. She also made the most frequent affirmative utterances. In fact, Marcella's contributions to the discussion suggest that being assigned the role of leader for a particular topic was a stronger mediating factor of frequency of vocal contributions than was proximity to the laptop and assignment document.

One did not have to be assigned the role of typist or group leader to contribute to the authoring discourse. Other group members contributed vocal instances. In descending order Shannon (immediately to the right of the assignment), had 79 instances of vocal strategies. Laney (opposite the assignment) had 75 instances. Professor Ossem contributed 34 vocal instances. Ellyn who sat just to the left of the typist had 20

instances of vocal strategies. Annie sat two positions to the left of the computer and made two vocal utterances.

It may at first appear that Laney, the student opposite the laptop and assignment document was particularly active vocally. One might anticipate that a student might compensate for a lack of visual availability and access to the document by substituting vocal strategies. However, 35 out of her 75 contributions are affirmations and 6 vocal instances are laughter. Therefore, short vocalizations accounted for over half of her vocal contributions to authoring.

It was also worthwhile to consider the vocal instances contributed by the student sitting directly to the left of the typist. Ellyn contributed far fewer vocalizations in terms of both frequency and duration. However, it is important to consider the content of her contributions. Eight of her 20 vocal contributions were had consequences for gaining or granting access to and influence over the assignment. Her turns at talk were highly consequential relative to her overall vocal participation. Furthermore, she was the only group member who was directive to the typist regarding the organization and content of the assignment document. She was also the only group member that the typist consulted regarding such a matter. I argue that her physical position within the group and relative to the computer and assignment document were at least partially responsible for her entry into the structure of the document.

In my opinion, there was not sufficient or clear-cut evidence to conclude with certainty that proximity to the laptop was a factor mediating the amount of vocal contributions to the collaborative authoring task. True, the typist was particularly active vocally in frequency, duration, and variety of vocal instances. However, this may have only revealed a personal penchant for vocal communication. Nonetheless, I do believe that taking on the task of typist, or at least having close proximity to the assignment

resulted in differences in the *kinds* of vocal contributions students made. Ellyn was not vocally prolific, but she was influential in ways that other students were not. As the typist, Stuart also had concurrent vocal, visual, physical, and aural interaction with the ideas entering the assignment. Multiple modalities for engaging with the assignment arguably offered him more opportunities for encoding and thus retaining the information going into the assignment document. It was a difference that could easily have resulted in differential opportunities to engage with, encode, and thereby retain and/or apply the information that was supposed to be learned.

Gaining, granting and guarding consequences

There were 514 total vocal entry strategies coded in the timeline. Of these, 53 instances, or 10.31% were associated with gaining, granting or guarding outcomes for the assignment document. Students in this group were more likely to gain entry than to grant or guard entry into the assignment. There were 31 vocal instances resulting in gaining outcomes, 5 vocal instances resulting in granting outcomes, and 7 instances that guarded entry into the assignment. Declarations were the most consequential entry strategies for this authoring group. The 31 instances of declaration accounted for over half of the consequential talk during authoring. All coded guarding was done vocally. However, this may be an outgrowth of how data was coded. Data was coded only when an instance occurred. Non-vocal guarding may have occurred by omission of a vocal response or by what the typist did not include in the assignment document.

It made sense to place this case first in the discussion of my case-level findings because it was the first example of CSCA that occurred in the chronological life of the research project. However, this was not the first case that I coded during case level analysis. (The first case that I coded was the Community group that met and authored on 9.27.) By the time I was analyzing the data related to the immediacy group I benefited

from prior thought about the gaining, granting and guarding outcomes for associated with entry strategies. I had already come to the conclusion that students were entering the assignment on several levels. Therefore, in this case I marked and analyzed the levels on which these outcomes occurred. Were students gaining access or availability? Were they guarding availability or influence? I considered these questions according to the students' position relative to the assignment document.

If availability was the most basic level of entry into the assignment, to whom was it afforded? I concluded that Stuart, Shannon and Ellyn always had constant availability of the assignment during the CSCA hour because of their position relative to the computer. Any time these students wanted to see the content of the slides they had only to position their bodies or adjust their gaze in order to do so. I also concluded the other members of the group did not have availability of the assignment unless Stuart recited its content aloud. I marked only 11 instances in the timeline where Marcella, Laney and Annie had the content of the assignment available to them.

Access to the assignment was the next level of entry I considered. I found both vocal and non-vocal evidence of access. Visual indications that a student had chosen to view the screen such as leaning, gazing or pointing evinced they accessed the assignment. Stuart, Shannon and Ellyn were the students who had visual access to the assignment.

Students all position around the authoring table accessed the assignment through vocal means. When their discourse was directly related to the concepts, issues and ideas that were included in the document I considered that evidence of access by means of vocal strategies.

Earlier in my approach to data analysis I had resolved that evidence of influence consisted of organizational and textual components within the assignment document that reflected participants' talk as recorded in the timeline and transcript. Students in several

positions around the table were able to influence the document through vocal means. Thanks to a fortunate camera angle that captured the typist's computer screen, I was able to mark influence that occurred non-vocally in the immediacy group. In this case, Stuart was the only CSCA participant to have non-vocal influence on the assignment.

Analysis suggested that gaining, granting and guarding outcomes were achieved more often by the use of vocal strategies (116 instances) than by the use of non-vocal strategies (39 instances). There is a possibility that some physical strategies were involved in determining which ideas were included in the document but were not included in this coding scheme. For example, nods of the head may somehow influence how people decide what discourse is worthy of inclusion in the assignment. However, my codes only indicated physical action relative to the computer itself.

Secondly, most participants gained access (41 total instances), more often than they gained influence (17 total instances). This made sense as many more ideas would likely be proffered, considered and discussed than would be included in the final version of the assignment document. However, Stuart (because he served as the typist) was the only group member who had more coded instances of gaining influence (30) than of gaining access (12).

I confirmed that a guarding consequence was less likely to occur than either a gaining or a granting consequence. All coded instances of guarding occurred at the level of influence. This finding simply bears out what socially normative standards would suggest. It would be rude to blatantly tell a coauthor that they were not welcome to participate in the discussion. It would be equally socially unacceptable to shield another member's eyes or attempt to physically block them from seeing what was on the computer screen. But social norms do not preclude more subtle forms of exclusion.

Guarding may have been done frequently by omission or inaction, which did not lend itself to this coding scheme.

In sum, proximity to the assignment document did influence participants' gaining, granting and guarding outcomes on the levels of availability and influence. Proximity to the assignment document may have influenced participants' outcomes on the level of access.

Special findings: the online component

I compared transcripts with online posts and marked pages in the discussion forum. The content of online posts were linked with the content of face-to-face discourse. The marked pages revealed multiple instances where students repeated ideas, concepts and phrases during face-to-face discussions. Many even used word-for-word quotations from their posts when speaking about their topic. These linkages appeared in 12 out of 26 total online posts in the discussion forum. Those that did not have connections to face-to-face discussion were often short responses to other posts. Comments posted online became precursors or advance organizers for face-to-face discussions.

However, marking the discussion forum posts also revealed gaps between online and face-to-face discourse. Annie, who had limited English proficiency contributed the least to the vocal portion of the collaborative authoring assignment in terms of frequency, duration and variety of vocal instances. However, in the online discussion forum her contributions were equivalent with those of the group leaders for the topic. Annie posted four times and her posts contained a large number of both characters and words. She made substantial contributions in the online format. Nonetheless, the ideas and issues she contributed online were not discussed or written about during CSCA, nor were they presented to the whole class. For example, in one of her posts she wrote about the issue

of mediating factors affecting immediacy and learning. The mediation issue is included in the face-to-face discussion, but Annie did not contribute any comments about her online posting.

Stuart also wrote about the mediation issue in an online post. In contrast to Annie, Stuart not only contributed to, but also controlled the face-to-face discussion. Stuart took eight turns at talk related specifically to the idea of emotional mediation. Subsequently, he took 23 turns at talk concerning motivation, affective variables and approach-avoidance theories of behavior as possible mediating factors in teacher immediacy and student learning. This portion of the group discussion included several long pauses during which the other group members sat quietly while he visually scanned the online article to find the information he was looking for. All the while, no mention was made of Annie's original online contributions to the discussion about possible mediating factors other than to say, "there was another study that I saw somebody citing about the communication effect" (Transcript line 443). Therefore, Annie's online contributions to the thoughts discussed face-to-face were never fully recognized as such. She was not willing to assertively claim them as her own in the face-to-face setting.

Still, the act of translating her ideas and thoughts on the topic into text was a valuable cognitive exercise that should have helped Annie retain or implement her knowledge of the topic. Fortunately, Annie's online posts could help her make a case for her grade. In a course model where the instructor was fully responsible for assigning each student their final grade, Annie's reservations in face-to-face authoring were less of a problem than they would have been in a course requiring students to assess each other's performance. Students could easily mis-assign credit for ideas posted by a student who was not highly vocal or visible later in the face- to-face setting.

My own data did lend support for claims that text-based discussions can provide a forum for non-vocal students to have a say in group communication. Nonetheless, they also showed that a voice that found its place online was drowned out by other vocal contributions in face-to-face mode. Face-to-face interactions were able to override this student's contributions. She found her ideas marginalized in the final document as a result. Annie's ideas, however germane, were not offered as a valuable component of the shared knowledge that was generated and understood by the learning community as a whole. Further examination of the relationship between online and face-to-face contributions to collaboration in blended courses could prove to be a fruitful area for continued research.

CASE TWO: THE COMMUNITY GROUP

The second case group met on September 27th, 2006. Jessica, Marcella, Max, Renea, Shannon and Stuart discussed the topic of classroom community. The community group quickly discovered that there was no agreed upon definition of classroom community represented in the research. Jessica, Renea and Shannon had volunteered to serve as topic leaders. This was the second face-to-face class session that involved computer supported collaborative authoring. Continued references to the scaffolding questions during the large group discussion strengthened findings from the first case about the importance of the cognitive structures put in place by the instructor. The first minutes of small group discussion were captured at the end of the recording of the large group discussion. Students clarified the topic they were discussing before delving more deeply into the authoring task.

The community group was vocally prolific is comparison with the other coded cases. They had many instances of overlapping talk in conversation clusters that were on-topic, but not directly concerned with the creation of the assignment document. I

consider this overlapping talk as it related to consequences for entry into the assignment. In spite of the volume of their talk, the community group posted several articles to the online discussion forum that were never included in the final assignment document. These discrepancies revealed gaps between the content of online discussion as compared to the content of face-to-face discussion.

But I found that the most intriguing aspects of the community group in the last minutes of their CSCA hour. For example, other groups did not devote more than two to five turns at talk overtly discussing their roles and responsibilities. This group, in contrast, devoted several turns at talk negotiating the responsibility for presenting their document. Furthermore, this group of authors underwent a physical reorientation when a second student assumed the role of typist. I took this occasion to perform an even more fine-grained analysis of the actions and strategies surrounding this change.

Contributions to the online discussion forum

The community group developed and addressed two related topic questions about teaching styles and the impact of classroom community on learning. Responses to the topics first appeared on Monday, September 18th (Renea. Mon Sep 18 2006) and continued until Tuesday, September 26th (Ossem, M. Tue Sep 26 2006). There were 32 total posts included in the primary discussion thread. The number of discussion threads devoted to each topic had begun to contract as online communication gradually became more organized. Nonetheless, Shannon still began two additional discussion threads of her own. In all, there were 41 posts related to the topic of Classroom Community and Teaching Styles.

Comparisons of contributions to the online forum versus the face-to-face discussion revealed that much of the information posted online was not included in the assignment. Twelve total articles were reviewed in the discussion forum. (Stuart

reviewed two articles, but did not attach electronic copies.) Two of the twelve were discussed, but were not cited in the assignment. Four of the articles were neither discussed, nor cited. Only six articles were cited in the document. Three of these were added in the last five minutes of the hour after other group members had gone for a break. Table 5.2 shows the contributions to online discussion.

Table 5.2 Contributions to the Community Group's Online Discussion.

Participant	Total Posts	Attachments	Total Characters	Total Words
Shannon	9	3	10,818	1,979
Renea	5	1	4,503	835
Stuart	4	2*	3,966	738
Jessica	4	2	2,931	542
Max	3	2	5,950	1,141
Marcella	2	-	648	126
Dr. Ossem	11	2	2,742	571

Opening discussion with the whole class

All of the following images, descriptions and quotations were excerpted from video recordings captured on September 27th, 2006. During this whole class discussion Dr. Ossem was already prompting students to prepare for their final summary projects. Students asked questions about the scope of the final paper, and also their options for making connections between course content and their own research interests. Once the questions about the final project had been answered, Dr. Ossem transitioned the class into small group authoring. She reviewed the topics of discussion for the day saying, "Split up according to oh, let's see, um, motivation, community and diversity" (Video, 9/27/2006). Dr. Ossem repeated the four scaffolding questions again as ambient noises struck up around the room. Students lifted themselves and their bags, notebooks, beverages and other personal items for transport to their small group authoring space.

Computer supported collaborative authoring

Figure 5.7 shows members of the community group clustered around two of the modular tables that were already pushed together at the back left-hand corner of the room near the door.

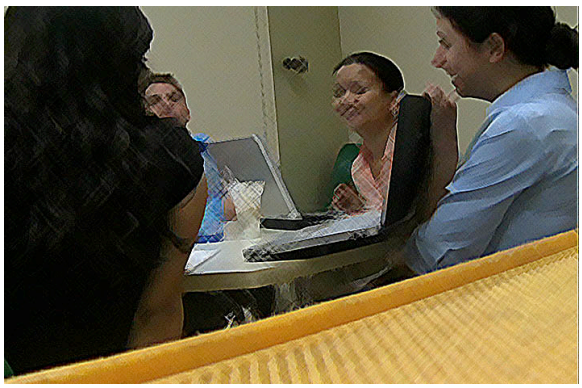
Figure 5.7 The Community Group

Audio was inconsistent at this point in the recording, but I could hear the group clarify how their discussion topic related to the other authoring group topics. Dr. Ossem reiterated that they should concentrate on their own topic during the CSCA hour. Then the whole class would identify relationships between the three small group topics during oral presentations. After Dr. Ossem left, Renea seemed to discuss an approach to organizing the assignment, talking about potential, "power point [slides] for each of those questions… parallel each slide" (Video, 9/27/2006). The community group determined that Marcella would serve as the typist.

Now the group had established what their topics of discussion were, how they would fit with the other group's topics of discussion, and who would record their ideas in the assignment. When Marcella created the title slide the group noted the attractiveness of the slide template. In figure 5.8 Marcella had briefly placed the laptop for other group

members to see the template and then returned her computer to the table surface to begin typing.

Figure 5.8 Marcella Places the Computer



Marcella's placement of the computer facilitated Stuart's, Max's and Shannon's ability to see the screen from1:05.03 to 1:07.09 in the timeline. This was the only instance in which these participants saw the assignment until the majority of the authoring was complete.

Stuart began to discuss how they didn't find a consistent definition of the community construct. At this point the first brief overlap in conversation occurred. One conversation cluster included Marcella and Renea talking about aligning the organization of the document with Dr. Ossem's scaffolding questions. Marcella's and Renea's talk overlapped the beginning of a discussion amongst other group members. The rest of the group speculated about three constructs involved in their topic: student-to-student interaction, student-to-teacher interaction, and student-to-content interaction. The conversation became reunited as all participants spent time considering the differences between "classroom community" and "learning community".

As the group considered where they would like to add this content the camera slowly fell backward and recorded still footage of the overhead light, (During this short

portion of the footage I coded only vocal instances in the timeline.) Meanwhile, the audio recording captured talk about how teachers could foster community in their classrooms using different teaching styles. Stuart introduced the idea that students affected the classroom community as well. He returned to a discussion that originally began online about a prior experience with a poor fit between student characteristics and instructor style. Throughout the authoring hour several turns at talk were devoted to this issue. And several times Stuart's utterances were word-for-word matches with text that he entered in his online post (Stuart, Sep 26 2006).

Just as I noticed and corrected the camera angle, discussion shifted to research on communities in online environments. During the group's discussion Renea periodically leaned over to look at Marcella's laptop screen and ensured that she had added the most recent content from the discourse. Each time Renea did this, the other students continued to converse. Their talk overlapped Renea's and Marcella's clusters of discussion about the assignment document.

Much of Renea and Marcella's interaction determined where the content should be added in the assignment. One of these exchanges was already described in Chapter Four. It showed how Marcella guarded against Renea's bid to enter information on the *What We Know* slide. The group summarized and discussed research on teaching styles, teacher concerns and how these were related to the construct of classroom community. They recounted personal experiences of their own growth as teachers. Marcella and Stuart concurred that information about how teacher concerns affected classroom community was to be included in the slide covering what the group didn't know.

Stuart questioned whether or not a particular article had reported that differences in classroom community arose from different approaches to group work. Jessica suggested they consult the professor, noting that she was one of the authors of the study.

Professor Ossem laughed lightly and stepped forward. She contributed to their discussion about group structure and then talked about females and classroom community. When Dr. Ossem moved to another group, participants clarified together what they had gathered from the research articles and the conversation with the professor. Dr. Ossem's contributions to the discussion were added on the *What We DO Know* slide as the third, fourth and fifth points under the Classroom Community heading, and as the first point under the Teaching Styles heading.

Shannon summarized findings from the articles she had posted in the online forum. The conversation turned to research and anecdotal findings on teaching styles and student involvement in curriculum development. After this dialogue, Marcella urged the group to determine the scholarly sources of the concepts they had discussed. Renea recollected an article concluding that using active learning techniques resulted in less class time spent in learning activities. Shannon noted that another article indicated that under certain circumstances passive forms of instruction could be the most efficient. Group members discussed why active learning was still preferable to more passive types of learning.

Amidst their conversation the professor announced that the remaining authoring time was limited. Shortly thereafter conversation split again into overlapping talk. Renea talked alternately with Stuart, then with Marcella in determining what to add to the slides. Shannon and Max had a brief discussion about the difficulties associated with successfully matching one's teaching style with desired learning outcomes.

Marcella repeatedly prompted the group to identify the source documents connected to the ideas included in the assignment text. Conversation split into overlapping clusters several times as group members alternated between generating new discussion, reviewing the content in the document and linking their research sources with

their claims. They laughed together about how much of the content on the *What We DO Know* slide had come from the article co-written by their instructor. Privileging research conducted by Dr. Ossem was yet another way in which input from the instructor influenced content in the document.

As the end of the authoring hour neared Marcella declared that she would like one of the topic leaders to present the assignment document. However, her request was unaddressed at this time because the professor, upon hearing the laughter about her citation, briefly approached the group and lightheartedly warned them that "uncritical discussion is pandering" (Transcript, line 652). After Dr. Ossem left the group, Renea noted a lack of citations supporting their claims about teaching style. Shannon however, indicated that she had identified an article that addressed this issue. Renea answered that they could add that to the slide describing how they could find out more about the topic.

Marcella tried again to determine who would take on the role of spokesperson for the group. She asked, "Whose questions were these?" in an attempt to identify the topic leaders (Transcript line 688). Renea answered that she had worked with Jessica and Shannon as topic leaders that week. Then Renea involved herself in an overlapping conversation with Shannon about the article that Shannon had tried to discuss in a prior turn at talk. Marcella engaged Jessica in a concurrent discussion about who would present the assignment. The following excerpt from the transcript showed how the discourse was divided as other members listened to Shannon report what one article concluded about teaching styles while Marcella advocated that she should not be the one to present the assignment to the whole class.

> Marcella: Whose questions were these? ((Pointed at computer screen with both index fingers.)) I'm just a tag-a-long. [{?}]
>
> Renea: [Oh it was Shannon 'n me], and Julia.

Marcella: Right would either of y'all like to do the ta[lking ((thrust hands toward the computer screen with palms facing one another and looked leftward toward Jessica)) since you know it the best?]

Shannon: Oh um m [or what about a effect].

Marcella: ((To Jessica)) Mm [do you want to look over the power point]?

Shannon: does each teaching style have, has on students

Jessica: does {?} when it's

Renea: ((to Shannon)) I'm sorry?

Shannon: What effect each teaching style has on students.

Renea: Yeah, right. Right.

Stuart: Even outside of classroom community just what effect does it have just to know.

Marcella: ((to Jessica)) I'm just saying I don't know if I would be the best one to talk about it since these weren't my questions.

Shannon: I found these two, those two articles…

Jessica: {?} yeah ((using her left index finger, she pointed at Renea and then Shannon, laughing)) pick her, pick her. (Shown in Figure 5.9)

Figure 5.9 Jessica Guards Against Presenting the Assignment

Stuart briefly interrupted the talk and excused himself from the group workspace. Marcella tried again to designate a presenter for the assignment.

Marcella: ((to Renea)) Do you wanna {?} ?

Renea: Oh did…((laughs)).

Marcella: I don't think anyone else wants to.

Renea: I can read the power point slides, yeah.

Stuart: ((Laughs, gazing toward Renea.))

Marcella: I don' know I mean I will but I didn't since {?}.

Renea: Oh I know I know. I'll read the power point slides [but]

Professor: ((From the front of the room)) [Ok fol]ks again, like four minutes, so if anyone needs to take a break.

Renea: if anyone needs to add anything that's fine. Like if you ((extends left hand toward Jessica)) wanna add anything for community you can, but I'll read it.

Jessica: ((Picks up a printed copy of an article.))

Renea: I mean in the moment Jessica, if you jus' think of something ((laughs)).

Group: ((Laughter)).

Marcella had finally established that she would not be the spokesperson for the group. However, it had taken three separate attempts and seventeen total turns at talk to negotiate who would take on that responsibility. This was much more frequent and complex overt negotiation of roles and responsibilities amongst group members than occurred in any other case. I marked each instance of overt negotiation of roles and responsibilities with gaining, granting or guarding consequences. 21 out of 29 total instances were marked with consequences. I concluded that when students engaged in

communication about roles and responsibilities it was highly consequential negotiation. Immediately after establishing the responsibility for the assignment was no longer hers, Marcella invited the other participants to review the assignment. She stood up and moved away from the table. (Shown in Figure 5.10)

Figure 5.10 Marcella Leaves the Table

Gazing toward Max and Shannon, Renea pointed casually to the assignment with her index finger and asked, "D'you wanna see what we have?" (Transcript, line 717). A significant physical reorganization of the group ensued. (Shown in Figure 5.11)

Figure 5.11 Community Group Reorientation

Shannon and Max both rose from their chairs and repositioned themselves behind Marcella's empty chair so that they could see her computer screen. Although the authoring of the document was largely accomplished already, this was the first time that students on the opposite side of the computer had seen the presentation document since they had admired the slide template.

Now the remaining four group members gathered around Marcella's laptop. Jessica Shannon and Renea discussed their main source of research on teaching style. Renea questioned why they hadn't added that to the document and suggested that they should. What followed was the subtle management of a change in the group's typist. This reallocation of responsibility is micro-analyzed in the following section with additional analysis.

Once the change in typist was established, Shannon typed as Renea related the story of her engagement and marriage to Jessica. Then Renea assisted Shannon in the process of aligning the new contributions congruently with the existing organizational structure of the document. Finally, Dr. Ossem said aloud, "Stop…We won't have time to work on our questions". Marcella returned to her original seat, asked for clarification about where to post the document, then uploaded the assignment to the online forum.

Additional Analysis and Observations

Special Findings: microanalysis of change in typist

Several groups engaged in some form of physical reorganization or reorientation during their authoring hour. However, on only three occasions throughout the semester did students shift the responsibility for typing from one student to another. This form of group reorganization involved both a negotiation of entry into the

assignment, and management of the roles and responsibilities taken on by group members. In my opinion, this instance of reorganization provided an opportunity for more fine-grained analysis to determine how students accomplished such a transition.

When the original typist left the group to take a break an opening was made, both literally and figuratively, in the space that she had occupied. Literally speaking her seat was now empty. Figuratively speaking the role of typist was now equally as unoccupied as Marcella's empty chair. A vocal invitation was made for other group members to access the document visually. When they collectively determined that important content was missing they had to decide how to add that information. Jessica was the first to suggest that Shannon should add the content. She did so initially at 55:25 in the timeline (that coincided with line 766 of the transcript). She lifted her hands and wiggled her fingers to pantomime a typing motion as she said, "Add it." Jessica repeated this motion again at 55:35 as Shannon rose up from her crouched position, and pointed to her anticipated destination on the other side of the table. There she retrieved her printed copy of the article they were discussing, then returned and lowered herself into the seat in front of Marcella's computer. Just as Shannon had taken a seat, Marcella returned from her break. Shannon swiftly rose from the chair.

It was a complex socio-contextual task to redistribute the responsibility for typing during an authoring session. This shift began and was nearly accomplished while Marcella was taking her break. However, when Marcella returned from her break Shannon apologized and hastily vacated the typist's seat. Evidently Marcella as both the typist and the owner of the computer had earned the right of first refusal. Renea invited Marcella to reassume the role of typist, but Marcella declined. Who would fill the space and add the content? When Shannon did not reseat herself immediately Renea reached toward the keyboard at an odd angle. Just as Renea's arms, hands and fingers extended

toward the keys, Shannon bent her knees and began to lower her body into the typist's chair. In the next moment Renea began to retract her arms and hands. Only then did she affirm vocally what had already been accomplished non-vocally. Shannon completed her descent into the chair and the role occupied by the new typist. Appendix B illustrates how the remaining group members re-established who would serve as the typist.

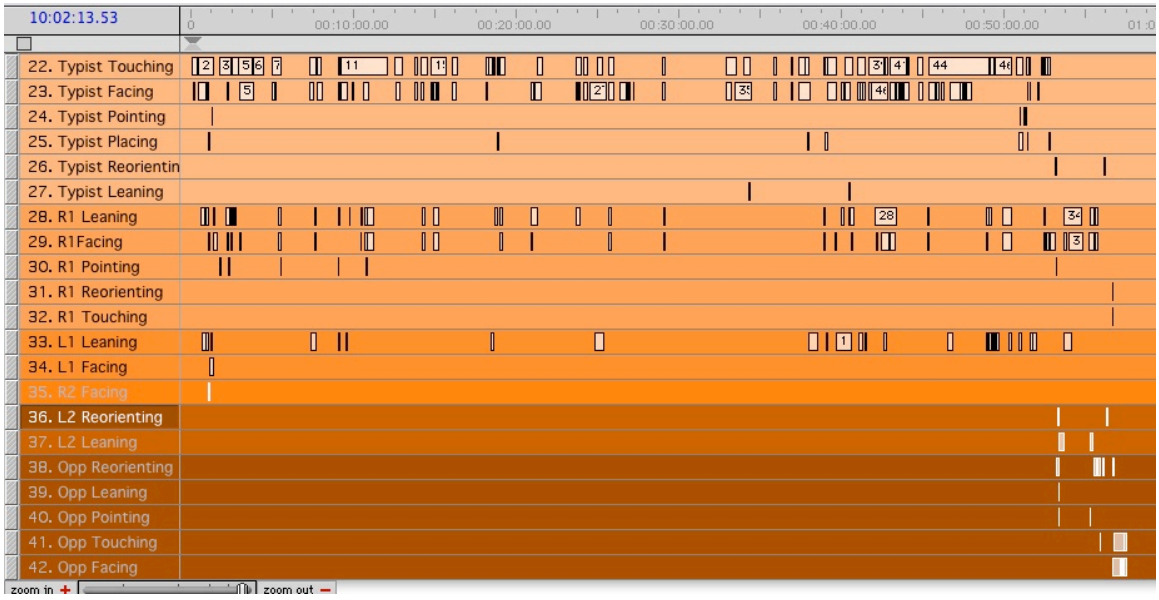
Non-vocal activity was pivotal as Shannon positioned herself to type. Subtle movements in the final moments during the change of typist had direct implications for the assignment. Specifically, the reorientation was critical in terms of Shannon's ability to gain entry into the document. Although she used several vocal entry strategies on more than one occasion in the authoring hour her vocal contributions had never been added to the document. But she positioned herself much closer to the assignment upon Marcella's departure. Only then did other students realize that the information drawn from the articles she had posted and reviewed were not reflected in the assignment. Shannon's physical relocation to the space in front of Marcella's notebook computer also made it possible to add her own ideas directly into the document. Shannon's additions to the document literally followed after her movement closer to Marcella's computer. In terms of gaining influence over the content of the document, Shannon's assertive vocal presence was still no match for her physical proximity to the assignment. Shannon's non-vocal entry strategies proved to be more effective means for having her ideas count in the textual representation of the group's shared understanding of the concept of community.

Non-vocal entry strategies

The coded timeline was a compelling visual representation of Shannon's non-vocal entry into the assignment. Her entry strategies were coded in the darkest lines at

the bottom of the coding window. Shannon's non-vocal entry strategies expanded at the end of the CSCA hour when she moved in to view the assignment shown in Figure 5.13.

Figure 5.13 Vocal Codes: The Community Group



The timeline also shows the discrepancies between the non-vocal participation of students who could and could not see the assignment. Students who could see the assignment contributed the vast majority of the total 253 non-vocal instances. They regularly engaged with the assignment throughout the hour using non-vocal strategies. But Shannon, Stuart and Max had hardly any physical entry until the group was taking a break after authoring was supposedly complete. Together they contributed only 20 non-vocal instances at the end of the hour. Shannon accounted for 15 of these instances as she reoriented herself and assumed the role of typist.

Vocal entry strategies

The community group was very active vocally as well. They produced many more total vocal instances (909) than either the immediacy group (514) or the mentoring

group in case three (406). One of the more interesting aspects of their vocal entry strategies was that much more overlapping talk (141 instances) occurred during this group than in any other that was transcribed and coded. My coding scheme treated talk directly related to the creation of the assignment document as the primary discussion thread. Any other topics were coded as overlapping threads. However in this particular group, the most prominent conversation was often about the topic under discussion, while talk about the creation of the assignment document happened as an "aside" between Marcella and Renea.

I mention this variation because subsequently, the overlapping conversations involved more vocal subcategories in the community group than in other groups. Interestingly, none of the overlapping conversations were marked with gaining, granting or guarding outcomes. Even when overlapping conversation was on-topic it was less likely to be added to the assignment than was the fully shared conversation. Moreover, scrutiny of the overlapping talk showed that members of the group positioned further away from the laptop were more likely to engage in overlapping conversations. A larger group size may not necessarily lead to off topic discourse but in this case it did lead to a less cohesive group authoring dynamic.

CASE THREE: THE MENTORING GROUP

Ellyn, Laney and Stuart met face-to-face on November 15th to synthesize and summarize the topic of faculty mentoring programs. This was their final computer supported collaborative authoring assignment. The scaffolds put in place during the first two CSCA class periods were still referenced in this authoring hour, but much more subtly. Stuart used regularly consulted a second computer to connect messages posted in the online discussion forum with their face-to-face communication.

Most importantly I began to understand that the authoring discourse addressed several different dimensions of the document. Sometimes students talked about concepts or issues related to research or personal experiences with mentoring programs. In other instances, group members made decisions about how the document was structured and how relevant concepts related to one another within that structure. At other times the group worked to shape textual elements of the document. They crafted a sentence or determined how to spell a particular word. The discourse moved in patterns from one dimension to the other and then back again over the authoring hour. As a result of analysis in the third case, I was able to update my model of CSCA once more.

Contributions to the online discussion forum

Blackboard postings related to the faculty mentoring topic first appeared on Friday, November 3rd and continued until Wednesday, November 15th. A total of 25 messages were posted in one discussion thread relating to the topic of teacher mentoring. Table 5.3 shows the contributions to the discussion forum made by the three students that participated in the face-to-face discussion.

Table 5.3 Contributions to the Mentoring Group's Online Discussion.

Participant	Total Posts	Attachments	Total Characters	Total Words
Laney	6	2	7,022	1,349
Ellyn	5	3	7,048	1,353
Stuart	3	-	2,680	553

Professor Ossem (3), Will (1), Shannon (4), Mitchell (2) and Jessica (1) accounted for the contributions to the online discussion about faculty mentoring that are not reflected in Table 5.3.

Opening discussion with the whole class

Figure 5.15 reveals that the class did not rearrange the modular tables into a large oval at the center of the room. Two students opened a negotiation about Dr. Ossem's flexibility with regard to the due date for the final assignment. She reluctantly agreed to a deadline that was later than the one printed in the syllabus. Participants quickly moved on to small group authoring.

Figure 5.14 Whole Class Discussion 11/15/2006

Computer Supported Collaborative Authoring in small groups.

The mentoring group did not rearrange classroom elements in gathering for small group work either. Rather, Stuart rose from his seat and moved to the opposite side of the table. As the group members settled into their seats and positioned their authoring tools and personal items, Laney gently advocated that she would type and the group agreed. Discourse began with talk about the members' progress on, and anxiety about the final paper. Ellyn moved into topic discourse by saying, "So maybe we should, like what did we actually learn about mentoring?" (Transcript, 11/15/2006). As this talk commenced, Stuart very slightly repositioned his computer and gazed at his screen. The physical arrangement of the mentoring group is shown in Figure 5.15 below.

Figure 5.15 The Mentoring Group

Topic discussion was briefly interrupted as the group considered potential design templates for the assignment. It was the visual aspects of the document that prompted the first physical shifts in the group. These were not full reorganizations, but rather two instances of extreme leaning accomplished by Stuart. He lifted his torso over the table and extended his neck and head, turning to his left to face the notebook screen. (Shown in Figure 5.16)

Figure 5.16 Stuart Leans and Faces

When an acceptable aesthetic option could not be quickly identified, the group members opted to move on to topic discussion. They agreed to revisit the issue of assignment appearance when authoring of content was complete.

Figure 5.17 Gazing at the Discussion Forum

The group discussion board functioned as a starting place or springboard for the topic conversation. Ellyn asked, "Ok so what did you post about mentors?" Ellyn and Stuart gazed again at his computer screen (Shown in Figure 5.17). Stuart responded saying, "Ok, so one thing I think I know is….", (Transcript 54). This comment evinced how Stuart returned to the original scaffolds Professor Ossem put in place at the beginning of the course. No one had overtly asked, "What do we know?" during this CSCA exchange. The mentoring group did not include a *What Do We Know?* slide that was entitled as such in the final assignment document. Yet the content of Stuart's declaration indicated that his thinking was still shaped by Dr. Ossem's original scaffolding questions.

This cognitive support helped the group successfully transition from talk about the appearance of the assignment into discourse about the concepts involved in the topic of faculty mentoring programs. First, Stuart recalled that mentoring programs for faculty appeared to be targeted to women and minorities. Ellyn remembered that many of the studies were qualitative or descriptive rather than experimental. Group members then discussed what Laney entitled, "problems with research" (Transcript 11/15/2006).

Within these issues they included small sample sizes and a lack of objective measures that could be used in evaluating the impact of mentoring programs. The students noted that it would be very difficult to isolate the effects of mentoring on teaching in an experimental study. Laney asked where this information should be included in the document. Ellyn answered that she didn't think it needed to be included at all. However, Stuart offered a statement in contrast suggesting that the difficulty in isolating the effects of mentoring should be included with the problems with research section. The group members briefly considered the wording of this bullet point in the slide.

This sequence of dialogue shows a progression from broad to narrow dimensions of entry into the document. Ellyn prefaced this exchange in a prior turn at talk with a question that addressed the broadest scope of the topic, "Ok so what did we post about mentors again?" Group members immediately shifted to talk about the concepts that they included in the online forum. They identified what they felt were problems with research the negotiated how these ideas fit into the organization of the assignment. Finally, they talked about specific wording of bullet points on the slide.

The discourse returned to conceptual talk about trends in research on faculty mentoring. It gradually narrowed to Laney's descriptions of how she had represented that information in the document. She said "Um. So types of mentoring programs I jus/ 'r I I can change that as a title but um... [Is that] formal mentoring programs seem to be targeting minority groups and then a sub-bullet women and ethnic minorities, an' then specifically [African-American]." (Transcript lines 118, 120)

The cycle began again when group members noted the large variety in the intensity or the amount of time required to participate in mentoring. Stuart referred again

to the online forum both vocally by reading from the online forum, and non-vocally by pointing to the screen (shown in Figure 5.18 below).

Figure 5.18 Pointing at the Discussion Forum

He recalled that he and Ellyn discussed online how mentors could shape the effectiveness of programs. Ellyn suggested a heading title saying "Um, how 'bout like characteristics of potential mentors?". Group members discussed what would be organized under that heading. They connected those concepts to additional discussion about characteristics of new faculty mentees. Laney invited input about where to place these ideas within the assignment.

Laney: Ok so where should I?

Ellyn: That could be characteristics of potential mentors.

Stuart: I was thinking something like characteristics of mentors, mentees and programs.

Laney: Oh, that's good. Yeah. So I have

Stuart: Or joining them all on one page.

Laney: I'll make a new slide. 'r characteristics of potential mentors, I'll make a new slide for mentees, right?

Although Laney took up Stuart's suggestion for organizing concepts around characteristics of potential mentors, mentees, and programs, she did not incorporate his

suggestion to join them together on one page. Instead, she created separate slides with each of these concepts as slide titles.

As the discourse progressed, the group members continued to discuss research related to their topic. Stuart periodically referenced the online forum to refresh the face-to-face discussion. Laney typed, asked questions about what he and Ellyn had discussed, and described what she had written on the slides. Stuart looked quietly at his notebook screen while Laney and Ellyn exchanged several turns at talk with Dr. Ossem about her earrings. After the professor had moved on he asked if they had emphasis of mentoring programs included in the assignment. Laney repositioned the assignment notebook so that Stuart had visual access to the screen. At this time Stuart suggested devoting an entire slide to the emphasis of mentoring programs.

The group members spent the next few turns at talk discussing the focus of mentoring programs. They noted that some tried to help faculty navigate organizational or bureaucratic aspects of their new institutions while others emphasized teaching and still others mentored faculty in research. Several turns at talk were devoted to textual aspects of document production regarding the proper way to spell bureaucratic. Ellyn noted that CSCA time was drawing to a close in five minutes. After completing the content of the slides, the group looked again for a more appealing design for the slide templates. They settled on a mutually agreeable option, then stayed in their authoring configuration and talked about topics for the final project and their research interests.

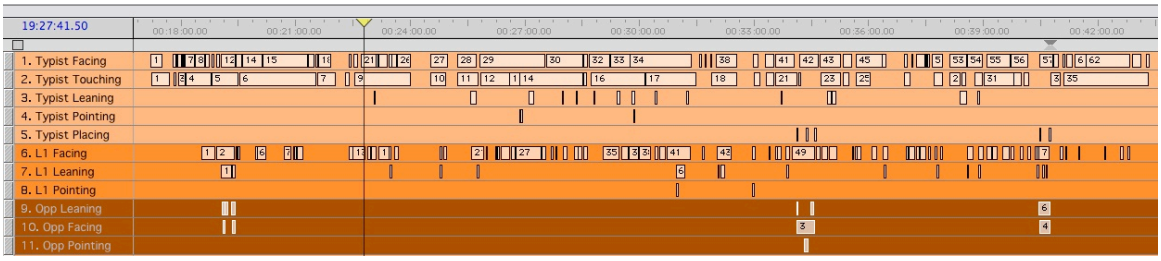
Additional Analysis and Observations

Non-vocal entry into the assignment

It was not only the assignment document that shaped cognition and collaboration. Subsequent studies might consider how other notebooks functioned in CSCA because

one of the most interesting findings in the mentoring group involved Stuart's non-vocal interaction with his own computer. Visual access to the discussion forum facilitated Stuart's vocal contributions to the face-to-face discourse and to the final content of the assignment. But Stuart's position on the opposite side of the table hampered his entry into the assignment by physical means. Figure _ shows the summary of physical entry strategies over the course of the CSCA hour. Laney's instances of physical entry are marked in the light orange section of the timeline. Ellyn's instances are indicated in the moderately orange coding lines and Stuart's strategies are shown in dark orange in Figure 5.19.

Figure 5.19 Non-vocal Codes: The Immediacy Group



The coded timeline reveals that Stuart used non-vocal entry strategies on only three occasions during the authoring time. The first occasion is pictured in Figure _ above as Stuart leans over the table to see the purportedly unattractive design template. The last occasion was also prompted by aesthetic concerns. On the second occasion pictured in Figure 5.20 below Laney facilitated Stuart's by placing the computer in his sightline. Stuart pointed to the assignment and made a suggestion about the addition of another slide. The second occasion of Stuart's non-vocal entry into the assignment coincided with the following portion of the vocal discussion:

Stuart: So we've like emphasis 'r of programs is that what you're sayin'?

Ellyn: Yeah.

Laney: Yeah, I put that, ((moves hands to turn computer toward Stuart)) ok so…

Group: ((all members gaze at screen))

Laney: I don't know I just stuck it in there.

Stuart: I might make it a ((left index finger points to screen)) whole slide like uh, emphasis of mentoring

Laney: Ok.

Stuart: Programs maybe?

Figure 5.20 Stuart Points

Laney's placement of the notebook in Stuart's sightline had direct implications for his ability to influence the assignment. Immediately following visual access of the assignment Stuart influenced both the concepts within, and the organization of the document. Placement of the computer and the discourse connected to that move was highly consequential in terms of granting and gaining outcomes. In contrast to Stuart's infrequent non-vocal engagement with the assignment document, Laney and Ellyn had been regularly leaning and facing throughout the entire CSCA hour. As the typist Laney used the widest variety and most sustained use of physical strategies. Ellyn contributed more frequent, but briefer instances of facing and leaning than Laney. Stuart engaged in the fewest instances of physical entry strategies with the shortest durations of physical

entry. The physical arrangement of even a small authoring group still influenced member's non-vocal entry strategies.

Vocal entry into the assignment.

Overall, there were 406 instances of vocal contributions to the authoring process. This number represented fewer total instances of vocal contributions to the authoring of this document than in the first two coded cases. However, there was a slightly higher percentage of gaining, granting or guarding outcomes associated with the mentoring group's discourse. Of the 406 total vocal entry strategies, 62, or 15.27% were associated with consequences for the assignment document.

There were far fewer instances of overlapping talk (17) in the mentoring group as well. None of these were instances involved in conversational clusters outside of talk about the assignment document. That is not to say that these group members never included conversational content that was not directly related to the authoring of the assignment. But when the conversation did turn to a scene from an episode of the cartoon *Tom and Jerry* for example, all of the students were involved in off-topic conversation together. In my judgment, the smaller group size was responsible for creating more shared focus amongst group members during the authoring process, whatever the topic of discussion.

Students in this group were more likely to gain entry than they were likely to grant or guard entry into the assignment. There were 43 vocal instances resulting in Gaining outcomes, 17 vocal instances resulting in granting outcomes, and only 2 instances that guarded entry into the assignment. Declarations were the most consequential entry strategies for this authoring group. The 34 instances accounted for over half of the consequential talk during authoring.

As in other cases, the inability to view the assignment at all times did not preclude a participant's ability to influence its content. However, physical proximity to the assignment was more clearly associated with greater vocal participation in the mentoring group. Laney made 149 vocal contributions from 9 of the 12 vocal subcategories during the authoring hour. She delivered the most questions, summarizations, contentions, punctuation, laughter and overlapping declarations. Laney was the only group member to engage in recitation. Ellyn's physical position in relation to the assignment laptop helped her make contributions to the discussion and the assignment too. Ellyn made 136 vocal contributions from 9 of the 12 vocal subcategories to the discourse. She gained entry in 18 instances, granted entry 6 times and guarded entry twice. Ellyn enjoyed visual and auditory availability, access and influence over the assignment. She contributed vocal instances that evinced her engagement with the assignment in all four dimensions of entry as well: intellectual, conceptual, organizational and textual.

Stuart's contributions to other CSCA groups early in the semester showed that he was vocally active in the authoring process. In this group, however, his vocal contributions were outpaced by both of his female coauthors. He contributed 106 total vocal instances to the discourse. He gained entry 16 times, but never granted or guarded entry into the assignment. Stuart's engagement with the assignment was primarily auditory in nature. He had only three occasions of visual availability of the assignment.

I should note proximity to the assignment was not the only factor mediating vocal contributions to this group. Laney and Ellyn participated in the same CSCA groups in every face-to-face session throughout the semester. They were the only two students in the class who always authored together. Laney and Ellyn often sat next to one another during large group discussions or whole class presentations. And, on several occasions I noticed that they were walking and talking together in hallways and other spaces in the

education building such as the technology resource desk, water fountains or restrooms. These observations led me to surmise that both Laney and Ellyn shared a closer relationship with one another than either Laney or Ellyn shared with Stuart. Their close association may have shaped Ellyn's ability to enter into the assignment document when Laney was serving as the typist.

Special findings: patterns in the discourse

I had begun to see how participants talked about different dimensions of entry into the documents they created during CSCA. The intellectual dimension stemmed from a broad understanding of the discussion topic. Participants also engaged discourse around the conceptual dimensions as they established a familiarity with the research, issues or ideas associated with that topic. Communication about organizational dimensions of the assignment allowed them to decide how these concepts were related to one another and how they should be organized in the document. Decisions had to be made about textual dimensions as well because students had to represent their ideas as accurately and succinctly as possible. Aesthetic dimensions were also considered when students chose slide templates or font styles and colors to help them communicate in text. The following excerpt from the transcript shows how the mentoring group addressed several different dimensions of the assignment in the first minutes of their authoring hour.

> Ellyn: And then also the other thing I remember is that the research is really crummy because they don't look at {?} oh here's my understanding or here's my experience with mentoring programs.
>
> Stuart: Yeah. Case studies.
>
> Ellyn: Yes. And then also like, not like across campus. It's {?}.
>
> Stuart: Yeah. Well that's what I think I was saying was that {?}. Uum.
>
> Laney: So the problems with the research, what did you say?

Ellyn: So, uh, oh lots of case studies. And/

Stuart: No cross-campus.

Ellyn: Yeah. An/

Stuart: That's a problem I cited wasn't it? Was the, like when you for most of the {?} around that exists was a really small [sample size]

Ellyn: [small sample size]

Stuart: And the:n ah the programs would be different or wouldn't be administered exactly the same way.

Ellyn: A:nd they're not really using objective measures.

Stuart: Yeah.

Ellyn: Like, they'll do things like

Stuart: Well what would be objecti, what would be objective measurement?

Ellyn: Well like… or…

Stuart: I mean…

Ellyn: I mean if, if the point of mentoring programs is to improve teaching, then their {teaching should be measured.}

Stuart: Right.

Ellyn: As opposed to like, let's look in your journals and oh, this person said I had a lovely meeting with my mentor.

Stuart: You can see ho/. I mean I know in a sense you're talking about classes, you would see how, what that would do in measuring. {?} improvement in teaching could be measured by improvements in student evaluation but how in the world would you isolate out that this teacher's student evaluations were increased as a result of this mentoring program?

Ellyn: That's one of the, one of the articles I found and it was more about bad teachers than about mentoring, but it was saying that new teachers who went to professional development, like had mentors, they got better. But you had no idea if that was because they were kind of like, self-starters who would pursue that kind of program.

Stuart: {?} getting better

Ellyn: Yeah, and so, or if the professional development

Laney: What were you just saying? I'm sorry.

Ellyn: Oh that's ok.

Laney: Where should I put it?

Ellyn: I don't think you have to put it anywhere.

Stuart: Well I think probably problems with research.

Laney: I have problems with research, so do not use objective measures?

Stuart: Yeah.

Laney: ((turns head toward Ellyn)) That's what you were getting at, ok? So.

Stuart: Yeah.

Ellyn: [Yeah]

Stuart: [Or] you could say no objective measure of {time or impact} 'r stuff like that. 'R that's fine that…

Ellyn: [No tha/]

Stuart: ['r no objective measures is fine.]

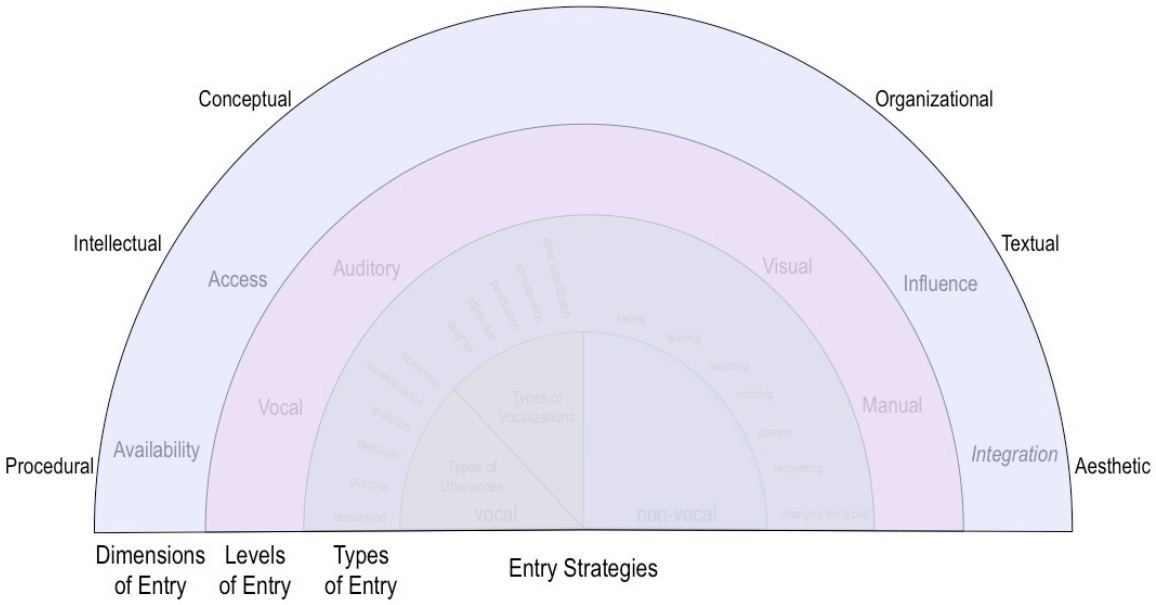
This excerpt from the mentoring group transcript shows a progression from broad to narrow dimensions of entry into the assignment. Ellyn preceded these several turns at talk began with a question in the intellectual dimension by asking what they had learned about teacher mentoring. Group members then discussed how these ideas should fit into

the organization of the assignment and even dedicated three turns at talk to the textual level. I highlighted the transcript with color-coded markings and concluded that turns at talk followed a similar pattern throughout the authoring hour. Early in group formation participants established a shared understanding of the topic they were supposed to discuss early in the authoring task. Afterward they engaged in several rounds of conceptual discussion interspersed with organizational talk. Occasionally they shared in textual level decision making about how to represent those ideas in heading or bullet points contained on the slides of the presentation. Twice group members even collaboratively discussed and established the correct spelling of particular words they had chosen to use in the assignment.

Even though he could not frequently see the computer screen, Stuart did show engagement with the assignment on three different dimensions: conceptual, organizational, and textual. But he participated in only nine turns of talk devoted to either organizational or textual aspects of the document. Therefore, his entry into the assignment was primarily in the conceptual dimension. Five of his nine turns at talk involved in organizational aspects of the assignment occur during or immediately following Laney's placing the computer for Stuart to see. I hypothesized that visual access would increase the amount of talk involved in discussing the assignment in the organizational and textual dimensions.

As I engaged in negative case analysis I remembered that some turns at talk were devoted to determining the group's roles and responsibilities. These utterances did not fit well under any of the first five categories I had identified. Therefore, I added the procedural dimension to account for discourse that helped students decide who would type or present the document to the class. Figure 5.22 shows the dimensions of entry added to my model of how students negotiated access to their assignment.

Figure 5.21 Dimensions of Entry



CHAPTER 6

Discussion and Implications

My data analysis was continuously guided by my initial research questions. However, additional themes emerged throughout my findings as I considered my three focused cases. I often referred to 1) connections between the online discussion forum and the face-to-face discussion, 2) instructor influence over CSCA and 3) student's proximity to the assignment document. These features of the CSCA experience repeatedly came to bear on the communication involved in the authoring process and product. In this chapter I examine how themes in my findings related to each of my research questions. I consider what these findings suggest about how computer supported collaborative technology shaped students' learning. I also discuss how these findings might cause us to consider implications on the institutional, instructional and individual level.

IN WHAT WAYS DID PARTICIPANTS NEGOTIATE ROLES AND RESPONSIBILITIES?

Several authors have claimed that collaborative writing is a complex process (Passig & Schwartz, 2007; Sharples, 1993; Sapp & Simon, 2005). This study showed that students engaged in computer supported collaborative authoring also managed a variety of elaborate interpersonal, intellectual and practical tasks. They identified and accomplished the primary authoring tasks that were required by the instructor. They collected and selected relevant contributions to their assignment ensuring that their work was and accurate reflection of their communication about the state of research on their topic. Time limits required them to control the flow of their work and state their findings

succinctly. Roles and responsibilities also emerged around and were tied to the computers that supported collaborative authoring.

Connections between the online discussion forum and face-to-face authoring

Review of the discussion board postings revealed that participants did post (at the beginning of the topic unit) a summary of which participant would serve as a topic leader for the unit. However, these postings only reminded participants of decisions that had already been made in face-to-face discussions where students volunteered to serve as topic leaders. Once participants began posting on a particular topic they did not overtly negotiate group roles and responsibilities in the online forum. The online forum did not result in extensive occasions for group members to explore or discuss the roles and responsibilities they would assume during face-to-face discussion.

On the other hand, face-to-face interactions did include vocal and non-vocal strategies directly involved in the work of negotiating roles and responsibilities. In most groups a rapid negotiation of who would serve as typist occurred early in the authoring hour. In the community group another substantial portion of communication was dedicated to the vocal and non-vocal negotiation of who would present the document. And in the second case, group members also underwent an unusual form of group reorientation when they changed typists. The change in typists was revelatory in terms of how the role of typist was closely tied to one student's ability to make contributions to the content of the assignment.

I marked the turns at talk involved in overt negotiation of roles and responsibilities to determine how many of these were associated with gaining, granting or guarding outcomes for entry into the procedural dimensions of the document. A very high percentage of these turns at talk were associated with consequences for the procedural responsibilities associated with the assignment. In other words, when a

student was involved in communication about roles and responsibilities, they were likely to be actively trying to secure or decline a particular function within group work. I conclude that while there was proportionately little talk about roles and responsibilities during face-to-face CSCA communication, it was highly consequential talk.

One interesting thing I noticed about the connection between online discussion forums and the responsibility for typing was the role they typist played during group work. Several students used phrases in talk around this role that suggested they viewed the typist as a secretary or recorder of the group's ideas. Broad scope and case level analysis revealed that on more than one occasion the student who served as typist had contributed less to online discussion than other participants. These students seemed to take on the responsibility for typing so that they could achieve legitimate group participation during face-to-face group work in spite of less participation during their week online. Fortunately these students were thrust into the midst of the discussion and the assignment in a way they might not have if they had not been typing. It is possible that their cognitive engagement with, and therefore their retention of knowledge about their weekly topic was thereby improved. This is an important finding for instructors who want to structure student contributions to group work. Hopefully an instructor could assume that assuming the role of topic leader would necessitate a deeper entry into the issues and concepts surrounding the topic of the week. Therefore, one might suggest that the topic leader and the typist should not be one in the same. If the instructor required two different group members to function as the topic leader and the typist respectively, then cognitive tasks and benefits could be more widely distributed amongst them. This wider cognitive distribution should increase the chances that all students would successfully create and retain knew knowledge even during weeks that they were not primarily responsible for seeding and leading discussion.

Instructor influence over CSCA

There was purposefully minimal direct intervention by the instructor regarding how students distributed roles and responsibilities. However, Dr. Ossem may still have shaped that process in unexpected ways. I did note during data analysis that students only overtly negotiated two roles and responsibilities: who would type and who would present the document. Interestingly, these were also the only two roles and responsibilities that the professor overtly discussed with and assigned to the class. A professor may subtly prioritize certain aspects of group work over others by what they do or do not directly address during the portions of the course where they establish goals and expectations for participation and grading.

Even though they did not speak about them directly, students managed various tasks other than typing and presenting during their work together. Broad scope analysis and case level analysis revealed that students did take on other responsibilities commonly associated with collaborative generation and editing of a shared text (Passig & Schwartz, 2007; Yang, Yeh, & Wong, 2010). Roles and responsibilities also emerged from the specific needs involved in computer supported collaborative authoring. For example, Renea functioned as a liaison between the group discussion and the typist in the community group. Ellyn filled the same role in the mentoring case. In case three Stuart functioned as a liaison as well. However, instead of connecting the discussion to the document, Stuart connected the online and face-to-face discussions with one another. Perhaps designating two additional responsibilities for connecting the two respective modes of discussion and the document would prompt group members to address those links more intentionally as well.

When designing collaborative learning instructors have the option to add simple or complex scaffolding in terms of roles and responsibilities for students. Each approach

can be beneficial in different ways. It was therefore an important conclusion to find that CSCA participants were not deliberate in their vocal division of roles and responsibilities unless they were specifically instructed to be. Should a teacher desire that students be more purposeful and direct in their communication about roles and responsibilities, they would have to clearly establish this goal for interaction as a group norm or expectation.

Proximity to the Assignment Document

There was some evidence that serving as topic leader was a stronger mediating factor of vocal contributions to the assignment than was proximity to the laptop. However, being close to or directly in contact with the computer was still intricately tied to the roles and responsibilities group members took on. Proximity to the assignment document was directly tied to the role and responsibility assumed in the case of the typist. But connections were clear for other members of the group as well. In two of the three coded cases it was the group member sitting directly to the left or right of the typist that served as a liaison between the typist and the group discussion. In other words this person ensured that the typist was kept abreast of conversation that occurred while the typist was entering text from a previous portion of conversation. The immediacy group in case one was somewhat an exception. Stuart remained very directive in conversation even while serving as the typist. Usually the conversation paused as he typed, and so a liaison was not as necessary in that case. Still, Ellyn who was sitting directly to his left was the only group member he directly consulted about the content of the document on the organizational dimension. And so, proximity to the assignment resulted in that group member taking on a role that no other group member ever did.

Review of the transcript in conjunction with the video and timeline revealed that a group member's proximity to the typist and assignment document would also influence their chances of taking on the responsibility of oral presentation of the assignment document. Typists themselves would often assume the role of presenting the document that they had taken such an active role in authoring. In case two Marcella did not want to present the document orally to the whole class. Although there were three topic leaders, Marcella only asked the two topic leaders on her left and right to assume the responsibility for presenting the document. Distance from the assignment document did not fully excuse other participants from responsibilities for presenting it. In all coded cases the designated presenter made statements that either gently invited or outright obligated other group members to share the task of presenting information included in their collaborative document.

In sum, the two most salient and overtly negotiated roles and responsibilities available to CSCA participants were 1) typing, and 2) presenting the assignment. An emergent responsibility for helping the typist keep track of the authoring discussion was assumed by a student directly to the right or the left of the computer. Proximity to the notebook computer was heavily tied to both.

IN WHAT WAYS DO PARTICIPANTS NEGOTIATE ACCESS TO THEIR ASSIGNMENT?

This research question undoubtedly led to the richest portion of my findings. Students had to balance invitations to share individual contributions to their discourse with an obligation to extract the most essential elements for inclusion to their document. I was able to build a model illustrating how students achieved one of three possible

outcomes as they negotiated entry into their assignment. Early trials using the model to accommodate each of the instances I coded have all been successful. Still I must note that the model I generated through grounded theory during this study is still a "middle-range theoretical framework that explain[s] the collected data" at this time (Denzin & Lincoln, 2000; Glaser & Strauss, 1967). Further investigation is needed to test the model for its ability to accurately represent the incredibly numerous combinations of instances and outcomes it could potentially represent.

Connections between the online discussion forum and face-to-face authoring

My data set revealed many connections between communication within the online discussion forum and communication in the face-to-face discussion. What participants posted in their messages online resurfaced when they met together in a shared physical space. Often they would pluck word-for-word phrases from their posts and insert them during vocal turns at talk when they met with their authoring group. The online forum seeded discussion. It prepared students in advance of their face-to-face meeting by helping them organize their thoughts in text before they were expected to share them in the moment through discourse. The mentoring group in case three also provided an example of one student who used his own computer to access and refer to posts in the discussion forum. Using the postings visually helped anchor his entry vocally into the face-to-face discussion. It also gave him opportunities to enter into the conversation even though he was not able to view the assignment.

There were significant gaps between the online discussion forum and face-to-face authoring. Whatever the cause of the disconnections not all information and ideas posted

made their way into the final document. The gaps could be framed in terms of information that did not enter the final document. The community group in case two had many examples of articles posted in the online forum that were germane to the discussion, but not included in the final assignment document.

Gaps between online and face-to-face communication might also be considered in light of students whose ideas were posted online but were not heard in face-to-face authoring. Annie was the first example of this kind of online to onsite gap. And were it not for the change in typist within the community group, Shannon may have provided another example. Further scrutiny of cases might yield more information that would help determine if this was a recurring problem for students who spoke English as a second language.

Instructor influence over CSCA

There were a variety of ways in which the instructor mediated negotiation of access to the assignment. My first finding was that the instructor was able to gain her own entry into the content of the assignment documents. The second case study also revealed that research conducted by the professor had strength in terms of its influence over the assignment.

The scaffolding questions that Dr. Ossem created were one of the main sources of negotiation of entry into the assignment. Many of the assignment documents were organized to directly address, or at least include answers to these questions. Group members referred to these questions in several turns at talk during group authoring each

week they met face-to-face. Broad-scope analysis revealed that scaffolding questions came in particularly handy as a way for groups to refocus their thinking when they encountered difficulties in the authoring process.

These early scaffolds stayed intact over the entire semester from the first to the last class. Moreover, students had to determine how the information they discussed around their topic was related to these scaffolding questions. Much of the conversation about organizational dimensions of the document was based directly on Dr. Ossem's scaffolding questions from the course syllabus. This finding should be heartening for instructors who are careful and purposeful in structuring their course content. The investment of time and thought in preparation for the class paid worthwhile dividends in terms of helping students successfully complete their assignments.

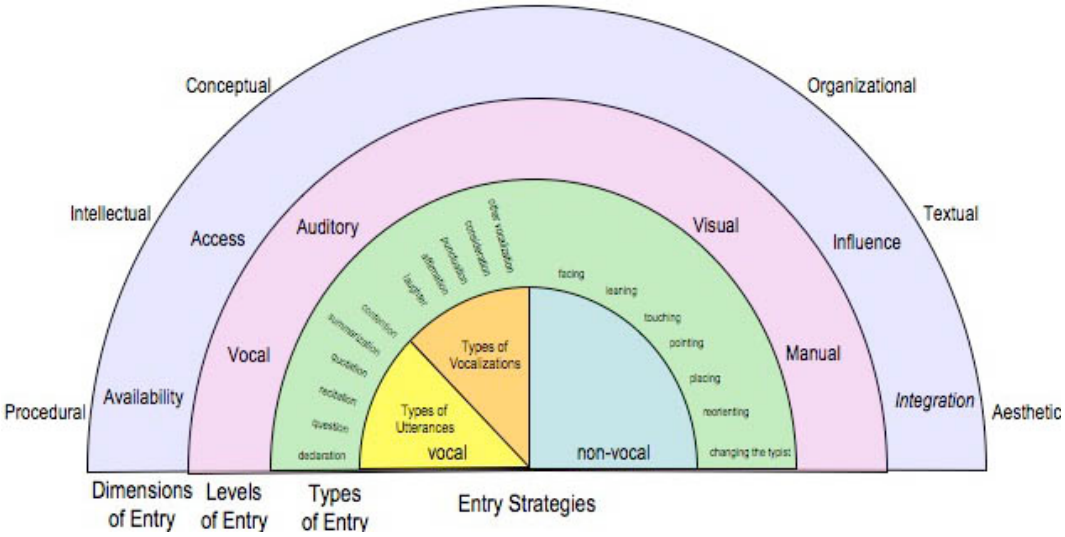
Proximity to the assignment document

Findings around this theme became the heart of my study. Data analysis revealed that proximity to the assignment was closely tied to the types of entry strategies available to CSCA participants. Those with close proximity to the assignment had a wider variety of non-vocal entry strategies on which to draw as they negotiated entry into the assignment. The model that emerged during data analysis speaks directly to the issue of how students negotiated access to their assignment.

Figure 6.1 illustrates that students used two main categories of entry strategies (vocal and non-vocal- with subcategories), to gain entry into the document. Their entry strategies resulted in four Entry outcomes (gaining, granting, guarding, none) of four types of entry (vocal, audible, visual, manual), on four Levels of Entry (availability, access, influence; integration); with 5 Dimensions of entry. The five dimensions of entry

were 1) intellectual- an understanding of what the topic of discussion was, 2) conceptual- how particular concepts or ideas informed discussion about the topic, 3) organizational- how these ideas and concepts should fit together and be structurally represented within the document, 4) textual- how these ideas and concepts should be specifically represented by words and phrases in the assignment document, 4) procedural-who will accomplish tasks associated with the document, and 5) aesthetic- how the document looks (font styles, colors, etc.).

Figure 6.1 CSCA Model



The final model could be used to map any particular strategy that was coded in the data set to show its implications and outcomes with regard to the assignment document. This model could be a valuable way to visualize the data points. It could be used with color-coded lines to map all entry strategies that occurred throughout the CSCA hour. Or, one model could represent one student. In this way it could be used to map each individual's entry strategies used during the CSCA hour. These maps could be valuable in subsequent investigations about communication in CSCA. The model might

also prove useful as a tool for assessment of student contributions to collaborative authoring assignments. It could be used to help an instructor visualize the frequency and qualities of a student's interaction during collaborative work.

Nowhere in my data set were the implications of a student's proximity to the assignment more evident than in the group reorientation and change of typist that occurred in case two. Shannon had tried several times to enter the document from the opposite side of the table. Each time her contributions fell short of the assignment document. Within minutes of her physical relocation to a position directly in front of the computer she was gaining influence over the document on many more levels than before. This aspect of my study extends findings by discourse analysis that investigates how communication is shaped by the ways people position themselves physical environments (Lebaron & Streeck, 1997). Shannon's experience highlights how socio-contextual dynamics tied to her proximity to an instructional technology affected her experience of collaborative teaching and learning.

My findings also extend previous research concerning the ways people place and position shared referents during their communication (Clark, 2003). My data show that students who were close to the assignment had a greater variety of strategies, especially non-vocal strategies, for entry into that document. This was important because non-vocal strategies that facilitated typing and even viewing the assignment were very influential ways to enter into the document. The influential nature of typing content onto the document was self-evident. But non-vocal entry through vision shaped the dimensionality of engagement with the assignment. In other words, when students saw

the assignment, they were more likely to talk about all of its dimensions, not only its conceptual or intellectual ones.

Therefore, it is my hypothesis that equalizing visual availability of electronic assignment documents would result in changes in the vocal communication during CSCA. Creating classroom infrastructure that allows students to work in small groups and share access to assignments should support collaborative learning. There are also a variety of technological approaches to accomplish this equality of availability. Screen sharing applications or synchronous, multi-user, web-based presentation applications allow users to co-view and co-edit documents simultaneously using their own computers. Even when limited access to computers necessitates sharing instructional technologies, projectors and external LCD monitors could enhance collaboration by providing a shared visual focus for group members. Recent research shows that these types of technologies can create shared visual spaces and contexts, thereby improving communication, collaboration and even cognition (Fussell, Kraut, & Siegel, 2000; Kraut, Gergle, & Fussell, 2002; Tan, Gergle, Scupelli, & Pausch, 2006). I believe that with equal visual availability of the assignment more students would engage with the discourse and the assignment on the intellectual, conceptual, organizational, textual and aesthetic dimensions. Even if seeing the content did not allow them to shape the content, at least students would be more aware of the organizational and textual dimensions of the document throughout the authoring process.

Research in the field of human learning suggests that socio-cognitive involvement has positive implications for student's learning (Greeno, Collins & Resnick, 1996;

Palincsar, 1998; Svinicki, 1999). A complex process is involved in collaboratively making decisions about how to distill or "extract the essential meaning or most important aspects" of intangible concepts and translate them into a form that can be shared (Oxford American Dictionary). Therefore, the multiple modalities for engaging with the assignment afforded to the students who could see the assignment resulted in increased opportunities for encoding and retaining that information.

WHAT WAS THE NATURE OF DISCOURSE IN CSCA?

Data analysis along my first two research questions helped me to build an answer to my third research question. My work in answering how students negotiated roles, responsibilities and access showed that the nature of discourse in CSCA was rich and multifaceted. Discourse in computer supported collaborative authoring was both vocal and non-vocal. Students used both oral and fully embodied communication strategies to interact with one another and their surrounding environment. Non-vocal discourse in CSCA was more affected by the physical arrangement of the authoring groups than vocal discourse. However, it appeared that vocal strategies for engaging with the assignment were not completely disconnected from non-vocal aspects of group work. The communication in CSCA was more concerned with the negotiation of entry into the assignment than it is with group members' roles and responsibilities. Findings within this theme led to the creation of a model that illustrated how students negotiated access to their assignments.

The instructor influenced the nature of discourse in CSCA. Professor Ossem's input was present to students in several ways. Firstly, Dr. Ossem built cognitive scaffolds into the structure of the CSCA assignments that helped students organize and discuss their knowledge. The instructor was also able to directly influence the content of

the CSCA documents by adding her own opinions to group discussions during her small group visits. And finally, the professor was able to influence CSCA through research. She provided links to articles that were informative with regard to the discussion topics each week. In one case she had actually conducted and published research that the community group relied heavily upon in their discussion and assignment.

Discourse in CSCA was distributed between online and onsite communication. The online forum served primarily as a clearinghouse for posting articles and seeding discussion. The face-to-face component allowed students to extend and further discuss ideas posted online. This study confirmed what previous studies have noted, that online and face-to-face components of the blended course offered different affordances to students (Abrams, 2005; Hawkes, 2007; Nicol and MacLeod, 2005).

Face-to-face communication was directly linked to online discussion. Students often referred to online postings visually or vocally during the authoring process. However, it did not fully represent all online contributions and included content that was not initially presented online. There were postings that may have produced valid contributions to the topic that did not make their way into the content of the final document. Furthermore, gaps between the face-to-face and online contributions of several members of the class revealed that the online discussion forum did not necessarily establish equality of contributions between group members.

Discourse in CSCA was also patterned. Participants followed patterns as they negotiated roles and access to the document. Roles and responsibilities were typically discussed in the earliest minutes of the authoring hour as participants established who would serve as the typist. If selecting a spokesperson for the group required overt negotiation this was done in the final quarter of the authoring hour as the responsibility for the presentation became imminent.

Patterns emerged as students negotiated access as well, primarily in terms of the dimensionality of the their assignment. Communication was initially concerned with discourse on the intellectual dimension of the document as participants clarified the topic they would discuss. Procedural dimensions were also addressed early in the authoring hour as students established who would fill the role of typist in the group. During the heart of the authoring hour participants repeated several cycles of discussion moving through the conceptual, organizational and textual dimensions of the assignment. Aesthetic dimensions were discussed early or late in the authoring hour either just as the assignment was being created or just before it was posted to the discussion forum.

Overall the nature of discourse in CSCA was a complex interplay of factors including online precursors to CSCA, group membership and size, ownership of the technology used in the authoring process, familiarity with the English language, familiarity with the topic of discussion, familiarity with other group members, and perhaps most importantly the students' arrangement relative to the assignment.

IMPLICATIONS

My findings involve implications for instruction and learning on many tiers within educational systems. Learning institutions must design and build facilities where teaching and learning occur. They must plan and structure curricula that support successful learning. These endeavors involve myriad decisions about allocating funds, creating educational infrastructure, purchasing instructional tools and technologies and training faculty to work with them. Fiscal and curricular decisions could be better informed by studies that show how educational environments and tools shape the ways students co-create learning. Institutional decisions can and should respond to ways in which students manipulate the physical elements of their classroom and interface with educational technologies.

Instructors also have myriad choices to make as they design activities and assignments. Some teachers are able to make decisions about how and where to conduct their classes. When they meet with students in a technology-rich environment they shape knowledge in unexplored ways by incorporating various learning technologies into activities and assignments. Instructors must also choose approaches to assessment and determine how well students are participating and producing in these activities. Instructors can and should prepare students to interact with one another in ways that maximize their ability to achieve learning goals. Knowing more about how their instructional decisions impact student interaction and learning can help faculty in the process of curriculum planning and student assessment.

The students themselves could also become more aware of how their relationships to educational tools affect their ability to learn and retain information. This study could inform even the simplest of decisions such as where to sit while working in a collaborative group. For example, students could be encouraged to find ways to equalize visual access. I hypothesize that having more equal visual access to their collaborative assignment would improve the chances that students learned from its content. Repositioning participants in relation to instructional technologies will probably not always cause students to have more influence on the assignment, but it might cause the assignment to have more influence on the students. Participants who were less active vocally and non-vocally in face-to-face authoring could still be visually engaged. Watching as the discussion was translated into pages, phrases and words-- seeing it's growth and modification concurrently with the discussion could have important implications for learning. Viewing the external and shared textual representation of the topic might influence student's internal and individual cognitive representation of that information. These kinds of improvements in teaching and learning using instructional

technologies cannot be realized without carefully attending to what teachers and students really do in their interactions with one another and their learning tools.

There remains a great potential for computer supported collaborative assignments of all kinds to shape the way students learn. With so many factors in play we have much orchestrate so that learning will be shaped in positive ways as new learning theories and technologies evolve with one another. That is good cause for stakeholders- from educational institutions to individual instructors- to continue explorations of the intricate intersection of computers and collaboration in the twenty first century classroom.

APPENDIX A

Vocal Strategy	Number	Total Time	%	Mean Time
Declaration	222	00:12:54.79	23.12	00:00:03.99
Affirmation	155	00:01:26.75	02.59	00:00:01.18
Question	63	00:02:31.49	04.52	00:00:02.56
Laughter	21	00:00:49.28	01.94	00:00:02.34
Summarization	10	00:02:32.34	06.00	00:00:15.23
Recitation	8	00:01:14.26	02.93	00:00:09.28
Quotation	6	00:00:55.76	02.20	00:00:09.29
Consideration	6	00:00:07.28	00.29	00:00:01.21
Other Vocalization	4	00:00:04.38	00.17	00:00:01.09
Exclamation	3	00:00:06.72	00.27	00:00:02.24
Punctuation	3	00:00:01.77	00.07	00:00:00.59
Contention	2	00:00:04.07	00.16	00:00:02.03
Declaration Overlap 1	14	00:00:30.42	01.2	00:00:02.17
Question Overlap 1	6	00:00:18.78	00.74	00:00:03.13
Affirmation Overlap 1	1	00:00:02.00	00.08	00:00:02.00

APPENDIX B

Microanalysis of Change in Typist

 Renea asked Marcella “Er, you can go ahead d’you wanna?”	 Marcella leaned down to pick up some personal belongings and said “No”.	 Jessica said “How ‘bout if you feel like these ideas are yours you add.”
 Renea leaned leftward.	 Renea placed her hands on the keys.	 Shannon began to descend.
 Renea lifted her hand.	 Renea retracted her arm.	 Renea said “Yeah yeah go ahead”.

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